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Washington Highlights

United States Attorney General Tom Clark plans to investigate recent increases in gasoline prices in California and elsewhere.

He disclosed this in a letter to California's Governor Warren. It was an answer to Warren's request for an investigation made a few days after gasoline companies announced a rise in gasoline prices. The Governor said the inquiry was necessary " to learn if the companies have acted in concert."

In a letter to Clark, Governor Warren said "I believe it is my duty to call to the attention of the Attorney General the fact that on three occasions the oil companies have recently increased gasoline prices and that within the last few months the companies have increased the price of gasoline a total of 2 3/10 cents a gallon."

A number of Senators have asked Clark for a full report on the recent rises in gasoline prices. His report will be forthcoming as soon as the Justice Department completes its preliminary examination of the matter.

Russell B. Brown, Washington general counsel for the Independent Petroleum Association of America, views price changes as the realization of a prediction made long ago.

"There is no mystery about the increase in motor fuel prices," Brown said. "The public explanations for increases in consumer prices for petroleum products have attributed them to the increase in prices of crude oil. This, I understand to be the correct explanation. It is obvious and logical that any increase in the price of raw material is almost certain to be reflected, in some degree, to the prices of the finished product."

By way of reminder Brown pointed to a letter of the Petroleum Administrator for War to the OPA Administrator in April 1943. He quoted from the letter as follows:

"My fear is that unless we are prepared now to permit some increases in oil price in order to stimulate increases in our available supplies, our reserves will continue to be depleted at such a pace that only drastic increases in prices—perhaps several dollars a barrel, as contrasted with a tenth of that amount if we act now—will be required to find and produce the oil we are certain to need both during the war and after. So far as the consumers of petroleum products are concerned, I am sure that they prefer moderate prices and adequate supplies for a long pull, rather than be compelled to pay for artificially low prices now with ridiculously high prices and scarcity a very little later."

Washington heard with interest remarks about price increases made by Reese H. Taylor, president of Union Oil, at the annual meeting of the company in Los Angeles on April 8.

Explaining that approximately 50 per cent of California crude oil production is made possible by the combined efforts of some 1100 independent companies, the oil executive asserted that continued operation of this group is of the utmost importance to the oil industry and the people.

He pointed out that if these producers do not receive a fair price for their oil, which will permit the operation of high cost wells, they will either shut down those wells or go bankrupt. If the wells are shut down, California will be forced to import oil from other states at an increase cost a barrel considerably over the present cost of California crude—even including the recent boost of 20 to 25 cents a barrel given California producers on March 20.

"It is difficult to say," he commented, "whether or not the recent increase in crude oil prices are enough to offset today's higher costs of processing and refining the oil, or of marketing and distributing the finished products.

"One thing is certain: the oil industry is no different from the meat, dairy, and other industries with which the public does business each day. If the demand for petroleum products is to be met, the consumer will have to pay higher prices, just as he does for practically everything else he purchases today."

* * *

The industrial life of the country breathed figuratively a sigh of relief with notice of voluntary dismissal of an appeal of the Mt. Clemens, Michigan, portal-to-portal pay suits filed in the Sixth U. S. Circuit Court of Appeals in Cincinnati by counsel for the employees' union.

Evaluation of Gas Condensate Reservoirs for Cycling

By William H. Justice
Tide Water Associated Oil Company
Houston, Texas

Introduction

The evaluation of gas condensate reservoirs is a current problem with the oil industry. A greater percentage of the reservoirs being discovered today by deeper drilling contain fluids of this type so that they are becoming of ever greater economical importance to the oil industry.

A gas reservoir may be defined as a reservoir containing a lean gas the composition of which does not change as the pressure of the reservoir is decreased by production. This gas usually contains less than 10 barrels of pentanes and heavier liquid per million cubic feet of gas.

A gas condensate reservoir, a rich gas, the most important characteristic of which is that the condensate content of the gas produced decreases as the pressure of the reservoir is depleted. This decrease in composition of the produced gas is due to retrograde condensation of the condensate from the gas in the reservoir. The condensation of liquid upon reduction of pressure at constant temperature has been called "retrograde" since it is the reverse to the normal increased condensate with increase of pressure at constant temperature. It has been estimated that as much as 50% of the recoverable liquid content of some of this rich gas condensate would be lost by retrograde condensation if the reservoir pressure is allowed to decline. The proper evaluation and the selection of most economical production method for these valuable reservoirs is an important and interesting work.

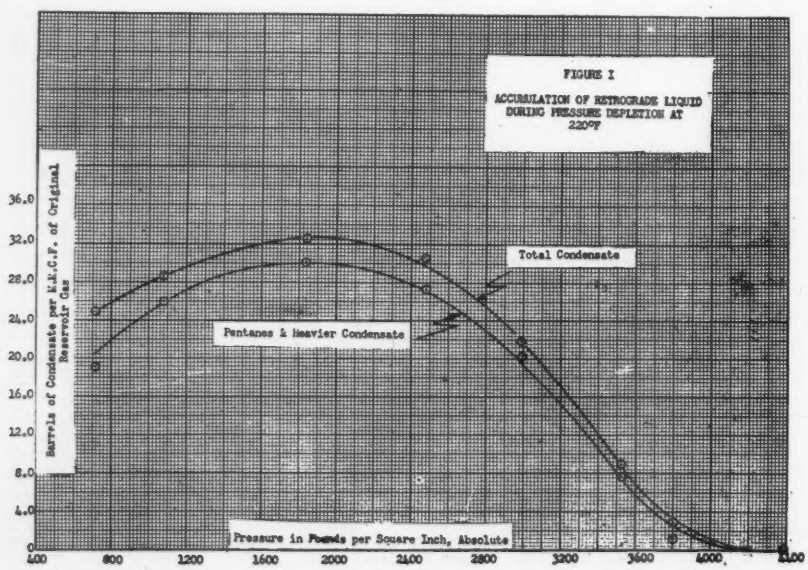
Physical Properties of Reservoir

The following physical properties of the reservoir should be determined as soon as possible after discovery.

1. Determine the thickness of each producing sand.
2. The porosity and permeability of the pay by complete core analysis of all the productive sand.
3. Determination of flow characteristics of the wells by flow test at various rates to determine the optimum rate at which the wells can be produced.
4. Estimate the connate water in the reservoir by core analysis and from the electric logs.
5. Accurately determine the bottom hole pressure and temperature of each reservoir with a conventional bottom hole pressure gauge.
6. Define limits of reservoir by the drilling of sufficient exploratory wells and by the study of the geophysical data for the area.
7. Locate and determine the throw of any faults cutting the reservoir by study of the well logs, geophysical data and surface geology.
8. Using the physical properties listed above estimate the initial volume of gas in the reservoir. This estimate is usually made using the porosity-acre feet method or if sufficient production history of the field is available the pressure-volume method may be used as a check for the first estimate.

FIGURE I

ACCUMULATION OF RETROGRADE LIQUID DURING PRESSURE DEPLETION AT 220°F



Reservoir Fluids

The determination of the composition of the reservoir fluid is very important and must be very carefully made. The analysis of the reservoir fluid is usually calculated from the analysis of the residue gas and liquid samples from the well separator. These samples for analysis should only be taken after the well has flowed for sufficient time for the production to become stabilized. It is customary to express the composition of the gas condensate reservoir fluid in mol percent of the various lighter hydrocarbons and express the mol percentage of the heavier hydrocarbons as heptanes plus. Usually the condensate content of the gas is given as gallons of pentanes and heavier condensate per MCF or as barrels of pentanes and heavier condensate per million cubic feet of gas.

The knowledge of the Pressure-Volume-Temperature relations of the reservoir fluid is essential to the efficient operation of this type of reservoir. This P.V.T. data is usually determined in a laboratory pressure cell. The cell is charged with a representative sample of the reservoir fluid by the injection of separator residue gas and separator

liquid into the cell in the exact ratio that they were produced in the full scale well separator. The pressure and temperature of the cell is then raised to reservoir conditions and the P.V.T. data determined. The most important data obtained is dew-point and the iso-thermal retrograde condensation curve obtained by maintaining the sample at reservoir temperature and withdrawing a portion of the sample remaining in the gas phase for each decrease in pressure. This retrograde curve is thought to represent the behavior of the fluid in the reservoir upon the reduction of pressure by production. The pentanes and heavier hydrocarbons that are condensed upon the reduction of pressure "wets the sand" and is probably permanently lost as it probably does not revaporize from the sand as indicated by the laboratory curve.

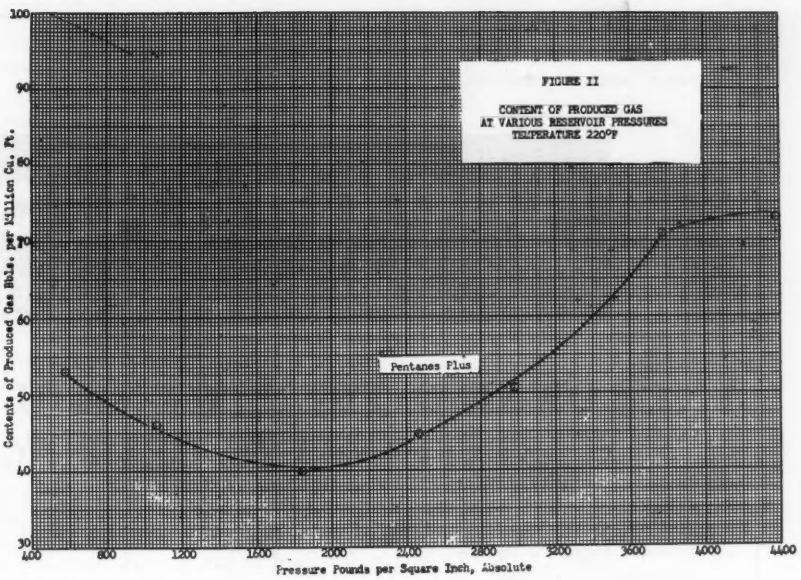
Cycling Vs Straight Depletion Of The Reservoir

All the above information on the reservoir has been obtained to arrive at the answer to the important question, "what is the most economical method of producing the reservoir?" Unfortunately, there is no simple and fixed answer to the question but the best production method depends on a large number of factors. Some of the most important of which are discussed in the following paragraphs.

Amount Of Retrograde Loss

The amount of condensate lost by retrograde condensation upon the reduction in pressure, as mentioned above, is one of the controlling factors in deciding whether or not the reservoir should be cycled. In the cycling process the gas condensate is withdrawn from the reservoir and the condensate extracted and the residue gas reinjected into the reservoir. By judicious location of the producing and injection wells it has been found possible to produce and recover by cycling over 70 percent of the gas originally in place with less than a 10 percent reduction in the reservoir pressure.

The retrograde loss, while cycling the reservoir, is estimated from the isothermal retrograde curve and the pressure reduction of the reservoir during cycling. This loss is suffered



by the volume of wet gas recovered by cycling. The wet gas not processed during the cycling period should be produced by straight production of the reservoir. The loss of condensate of the uncycled wet gas during pressure depletion of the reservoir estimated from the iso-thermal retrograde curve. The sum of the retrograde loss during cycling and during the pressure depletion period is compared to the estimated loss by condensate resulting from straight production of all the recoverable gas in the reservoir without cycling. In general the reservoir gases with the higher condensate content exhibit a greater retrograde loss upon reduction of pressure so that it is usually more profitable to cycle reservoirs containing the richer gases.

Field Reserves

The size of the reservoir is an important factor in the decision of the most economical method of producing this type of reserves. It is obvious that regardless of the retrograde characteristics of the gas if the reservoir is very small it would be uneconomical to cycle the gas since the field development and cycling plant cost would be greater than the value of the increased recovery of condensate.

A few fields are so badly faulted that the gas reserves are in effect segregated into numerous small reservoirs that would require a producing and injection well completed in each fault block to recover the gas by cycling. It is usually impractical to cycle faulted reservoirs of this type unless the condensate reserves in each fault block are large and the length of the fault block sufficient to permit a reasonable distance between the producing and injection wells.

There are some reservoirs in which the porosity and permeability of the sand is not continuous so that it is impossible to recover by cycling a high percentage of the wet gas. This variation in porosity and permeability of the sand may divide the reservoir into numerous small reservoirs that are not effectively connected.

The sand must have sufficient permeability to permit the withdrawal or injection of sufficient gas per well to permit an economical rate of production of the field with a reasonable number of wells. The productivity of the gas producing wells and the capacity of injection wells may usually be increased by acidization with an appropriate acid treatment.

Extent Of The Natural Water Drive Of The Reservoir

In a few reservoirs the natural water drive may be active enough to maintain the reservoir pressure with an economical production rate of gas and condensate.

It may not be economically advisable to cycle reservoirs of this

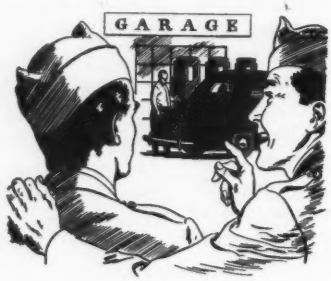
Looking Around

By THE OBSERVER

OWNING THEIR OWN CHEVRON GAS STATION—AND GETTING AHEAD

J. D. "Bus" Layton lived on a ranch in Idaho. A. S. "Tone" Kresich lived in Los Angeles. The father of Bus ran a garage at McCall, Idaho, on the shore of scenic Payette Lake.

War brought Bus and Tone together. They became buddies. The friendship deepened when Bus Layton's wife, an Idaho girl, turned out to have a sister. Before long Bus and Tone were brothers-in-law.



"Let's buy pop out," said Bus. "We'll run our own garage and service station."

The war over, that's what they did. To save expenses, and to beat the housing shortage, they also doubled up.

Presently there was a little Layton and also a little Kresich on the way. It became a race. Tone's daughter arrived first. Bus was passing out the cigars twelve days later.

The other day I stopped at the Chevron Gas Station sign at McCall. Bus leaped for the gas pump and Tone for my radiator cap. Then Bus was on the windshield and Tone at the oil. After that, Bus tuned up the automatic choke while Tone got to work on that left rear tire.

Two husky young Americans, owning their own Chevron station and garage, rearing brand new families, getting ahead.

Seems to me that's the sort of people I'm always running into, when I stop at Chevron Gas Stations. The friendly, energetic, self-reliant type. Does Chevron choose them because they thave those qualities? Or do they just naturally gravitate to Chevron?

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type where the gas can be processed in an efficient condensate recovery plant and the residue gas marketed or returned as make-up gas to another reservoir that is being cycled.

Difference In Recovery Of Condensate In Field Separator & Modern Recovery Plant

The recovery of condensate by cycling as compared to the volume recovered by straight production is not only the difference in recovery due to retrograde condensate but in addition usually involves the difference in recovery of condensate in the field separator and the recovery in a modern extraction plant. The sales demand from most gas reserves is so variable that it is usually not economical to install an extraction plant for the sole purpose of processing the sales gas so that the gas from reservoirs that are not cycled are often not processed in an efficient extraction plant. The recovery of condensate in a field separator is only approximately fifty percent of the total condensate recovered in a modern recovery plant.

Usually the condensate recovered in the field separator is sold at high gravity crude prices whereas the condensate recovered in the recovery plant is fractionated and sold as liquefied petroleum gas, gasoline, kerosene and heavier condensate at a price substantially higher than the price of crude oil.

Difference In Rate Of Recovery Of Condensate By Cycling & Straight Depletion

One of the advantages that cycling a reservoir has over straight depletion is the increased rate of recovery of the condensate. The cycling program permits the recovery of the condensate reserves at the rate of the daily plant production capacity, whereas with a straight production program the rate of recovery of condensate is limited by the daily gas sales demand.

General

The installation of the cycling plant permits a certain amount of marketing flexibility that allows the producer to realize an immediate return on his investment in the field. The cycling plant also makes it possible for the producer to have sufficient time to develop a favorable residue gas sale outlet to some gas transmission company, or to make arrangements for the construction of a Fisher-Tropsch type of gas conversion plant to convert the residue gas to gasoline, Diesel fuel and organic chemicals.

Illustration Of Method Of Estimating Recovery Of Condensate From Reservoir By Cycling And By Straight Production

In order to make this paper as practical and helpful to the industry as possible a comparison of the estimated recovery of condensate by cycling as compared to the recovery of condensate by straight production has been made for a hypothetical reservoir with the following characteristics.

Field Data

Number of Producing Acres in Field	19,250
Average Thickness of Net Productive Sand	27′
Total Acre Feet of Productive Sand	519,750
Porosity	25.0%
Permeability Milladarcys	3,000 Max.—600Min.
Bottom Hole Pressure	4,400 PSIA
Bottom Hole Temperature	220°F
Estimated Connate Water	30%
Deviation Factor of Gas	0.91
Porosity and Permeability of Sand is	Uniform
Open Flow Potential of Wells	70 M²CF per day

Estimate Of Gas Reserves In Place

Initial Volume of Gas in Place per Acre Foot

$$Vi = 43{,}560 \; p \; Pr \quad Tr \; S$$

$$VI = 43{,}560 \times .25 \times 4{,}400 \times 520 \times .70 \;\Big/\; Pb \; Ts \; Zr$$

$$14.64 \times 1680 \times .91$$

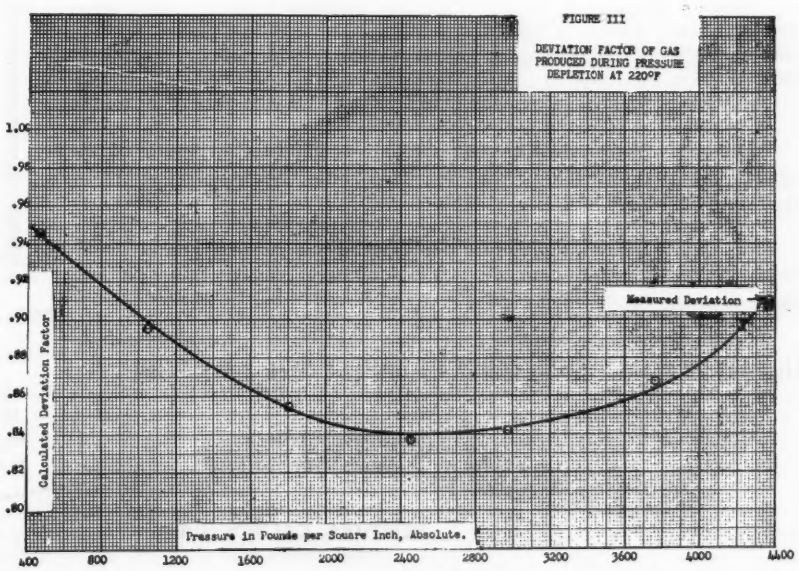
$$= 1{,}924{,}000 \text{ Cubic Feet}$$

Initial Volume of Gas in Place in Field

519,750 Acre Ft. X 1,924 MCF
= 1,000,000,000 MCF of Gas

Condensate Recovered by Cycling Compared to that Recovered by Straight Production

It has been found by experience that approximately 70 to 80% of the original gas in place in the reservoir can be recovered while cycling. This recovery can be accomplished with an average pressure drop equivalent to 10% of the original reservoir pressure or 440 pounds per sq. inch. This pressure drop is the result of the removal of liquid hydrocarbons from the gas as well as the gas consumed as engine and boiler fuel in the cycling plant. From the retrograde curve, Figure No. I, the estimated loss of condensate (pentanes & heavier) is estimated at 0.5 bbls. per million for the 440 pressure drop.



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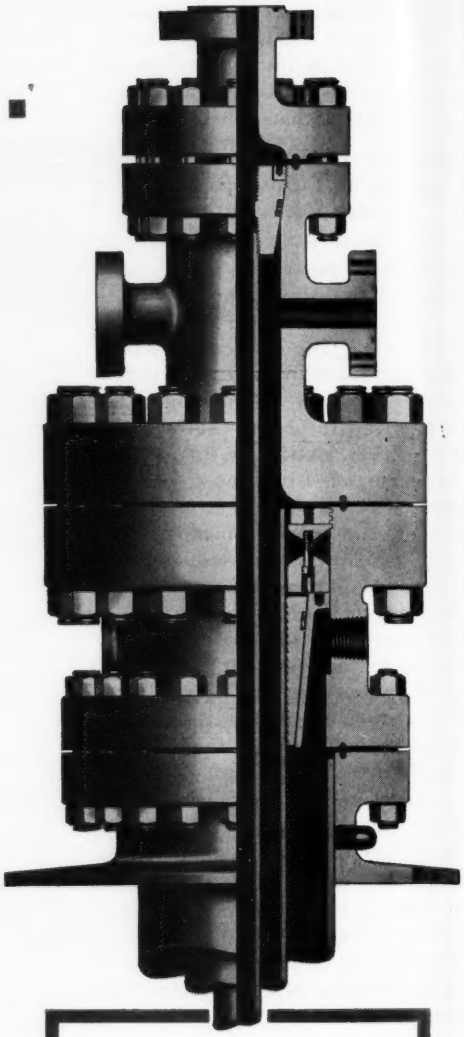

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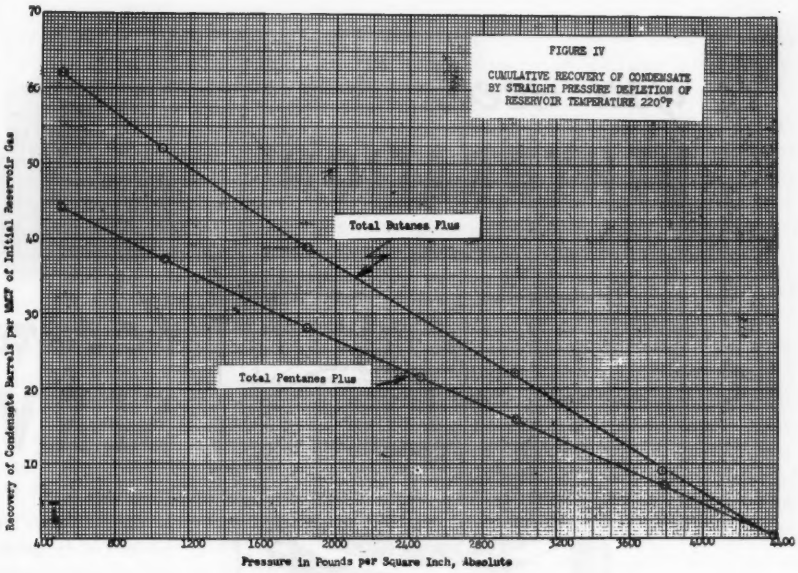
20%	256°F
30%	272°F
40%	308°F
50%	356°F
60%	412°F
70%	465°F
80%	523°F
90%	580°F
EP	615°F
Recovery	95.5
Residue	3.3
Loss	1.0
Specific Gravity	0.7936
API Gravity	46.8
Molecular Weight	144

The estimated recovery of condensate from the gas processed during cycling is estimated as 72.5 — .5 = 72 bbls. of pentanes plus per million cubic feet of original reservoir gas. The cumulative recovery of condensate in the uncycled portion of the field which will be recovered by pressure depletion after the cycling program is shown in Figure No. IV as 44.2 bbls. per million cubic feet of initial reservoir gas. The total recovery of condensate by cycling and subsequent depletion is estimated as 72 bbls. × 70% + 44.2 bbls. × 30% = 63.6 bbls. of pentane + or 87.8% of the condensate in the original reservoir gas. The total recovery of condensate from this field by cycling and subsequent depletion is estimated as 1,000,000 M²CF × 63.6 bbls. /M²CF = 63,600,000 bbls. of pentanes and heavier condensate.

The estimated retrograde loss of condensate in the reservoir at 220°F at various reservoir pressures is shown in Figure No. 1. The estimated cumulative recovery of condensate, by straight pressure depletion as shown in Figure No. IV is 44.2 bbls. per M²CF or 61% of the pentanes and heavier condensate in the original reservoir gas. The total recovery from the field by straight depletion is estimated as 1,000,000 M²CF × 44.2 bbls./M²CF = 44,200,000 bbls. of pentanes and heavier condensate.

The estimated recovery of pentanes and heavier condensate from this field by cycling and subsequent depletion is 19,400,000 bbls. greater than by straight depletion of the



RESERVOIR FLUID DATA

Component	Separator Gas Mol %	Separator Liquid Mol %	Liquid %	Reservoir Gas Mol %*	Reservoir Gas GPM	Reservoir Gas Bbls/M²CF
Carbon Dioxide	1.00	.....	.....	.90	.....	.....
Methane	85.24	12.65	5.31	78.05	.....	.....
Ethane	7.44	7.35	4.33	7.42	.....	.....
Propane	4.02	12.65	8.60	4.88	.....	.....
Iso-butane	.71	5.54	4.48	1.18	0.391	9.3
N-butane	.82	9.16	7.15	1.65	0.519	12.4
Iso-pentane	.22	5.54	5.02	.75	0.274	6.5
N-pentane	.15	4.70	4.21	.60	0.217	5.2
Hexanes	.21	8.55	8.71	1.04	0.426	10.1
Heptanes plus**	.19	33.86	52.19	3.53	2.126	50.6
Total	100.00	100.00	100.00	100.00	$3.04c_{5+}$	$72.45c_{5+}$

*—Calculated from separator liquid and gas analysis usnig actual liquid gas ratio.
**—Properties of the Heptanes plus residue from Separator Liquid Analysis:

TABLE NO. I

ESTIMATED RECOVERY OF CONDENSATE FROM HYPOTHETICAL RESERVOIR

Components	Hydrocarbons Originally Present in Reservoir: Bbls/M²CF of Original Reservoir Gas	Hydrocarbons Originally Present in Reservoir: Bbls from Total Reservoir*	Hydrocarbons Originally Present in Reservoir: Percent of Original	Recoverable Condensate: Cycling with Subsequent Pressure Depletion to 500 lb.**: Bbls/M²CF of Original Reservoir Gas	Cycling with Subsequent Pressure Depletion to 500 lb.**: Bbls from Total Reservoir	Cycling with Subsequent Pressure Depletion to 500 lb.**: Percent of Original	By Straight Pressure Depletion to 500 lbs.: Bbls/M²CF of Original Reservoir Gas	By Straight Pressure Depletion to 500 lbs.: Bbls from Total Reservoir	By Straight Pressure Depletion to 500 lbs.: Percent of Original
Pentanes and Heavier	72.5	72,500,000	100.0	63.5	63,500,000	87.8	44.2	44,200,000	61.0
Butanes and Heavier	81.7	81,700,000	100.0	76.6	76,600,000	93.8	62.0	62,000,000	75.8

*—Assuming the reservoir originally contained one trillion cubic feet of gas.
**—Assuming 70 percent of the gas originally in place is recoverable by cycling with a pressure drop of 10 percent.

BIBLIOGRAPHY

O. F. Thornton —Annual API, 1946
E. W. McAllister—Petroleum Engineering, 17 3, 90
J. P. Sloan —Southwestern District API, 1946
P. J. Jones —Mechanics of Production, 1946, Reinhold Publ. Co.

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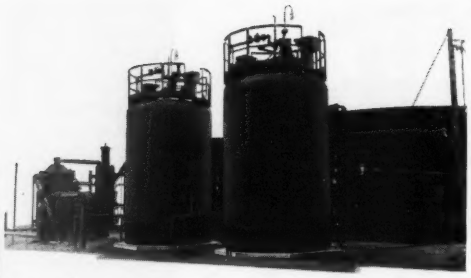

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reservoir. Of additional economic importance is the difference in rate of recovery of condensate by cycling as compared to the rate of recovery by straight depletion. With an assumed cycling rate of 200 M²CF per day 80% of the recoverable condensate will be recovered in the 14 year cycling life of the field. The present worth of the condensate recovered during the cycling period is considerably more than the present worth of condensate to be recovered during the long depletion period of the reservoir.

As previously mentioned the cycling plant is usually equipped to recover at least 80% of the butanes and from 30 to 60% of the propanes in the produced gas. Usually it is uneconomical to install an efficient recovery plant to process gas from reservoirs produced for direct sale to a pipe line market because of the wide variations in daily demand. The sales gas is usually processed through a high pressure separator which recovers a volume of condensate equivalent to approximately the pentanes plus content of the gas. Thus the actual salable recovery of condensate, butanes and propanes from the reservoir by cycling is usually greater than the difference shown in the above calculation. The above estimated recovery of condensate and butane from this hypothetical reservoir are summarized in Table No. I.

A comparison of the net income that can be realized from the production of the reservoir by cycling or straight depletion can be calculated from the above estimates of condensate recovery and by considering the field development cost, plant cost and operating expense required by the two programs.

Presented at the Annual Meeting, American Institute of Mining & Metallurgical Engineers, New York, N. Y., March 19-22, 1947.

Need for Continued Research Told CNGA-ASME

"A nation which depends upon others for its new basic scientific knowledge will be slow in its industrial progress and weak in its competitive position in world trade regardless of its mechanical skill," Dr. L. M. K. Boelter, Dean of the Department of Engineering, University of California, Los Angeles Campus, told members of the California Natural Gasoline Association and the American Society of Mechanical Engineers meeting in joint session at Rio Hondo Golf Club March 6, 1947. Boelter cited as his authority for this statement a report made to the President of the United States by Vannevar Bush, Director of OSRD. Pointing out that such knowledge is acquired only through research, Boelter stated that the future burden of continued research in the United States must be shouldered by industry. He promised industry the assistance of University Engineering Research Organizations in this task, and reviewed the contributions made by his own organization during the past year in the fields of heat transfer and fluid mechanics.

Of importance to engineers in all branches of the petroleum industry, was the development of an analytical expression for the pressure drop per unit length for two-phase (liquid-gas) flow in pipes in terms of the pressure drop per unit length due to gas flowing alone, and certain other system characteristics. Flow of this type occurs in the tubing and lead-lines of oil wells and in the tubes of stills and condensers. An analysis was also presented which makes it possible to compare the relationship between two-phase flow in capillary tubes and in porous media such as the sands of an oil bearing reservoir.

Improved performance in heat transfer equipment built for the industry in the future may result from investigations carried out in the field of heat transfer. Data developed in the transitional flow region for flow in circular ducts will be of assistance in the design of tubular heat exchangers. More efficient tube bank designs may result from data obtained during a study of the similarity and dissimilarity between local heat transfer and momentum transfer characteristics for flow over a cylinder. As a result of another study it is now possible to describe with a high degree of accuracy the rather complex combined free and forced convective heat transfer mechanism for laminar flow in vertical pipes.

Designers of combustion equipment will find useful the data on non-isothermal jets developed during a study of the velocity and temperature distribution of the exhaust gases from orchard heaters.

Boelter stated that all of the work referred to in his talk had been published and gave the following literature references:

"Isothermal Pressure Drop for Two-Phase, Two-Component Flow in a Horizontal Pipe" by Martinelli, Boelter, Taylor, Thomsen and Morrin. ASME Transactions, Feb. 1944. Vol. 66 No. 2.

"Two-Phase, Two-Component Flow In the Viscous Region" by Martinelli, Putnam, and Lockhart. AIChE Transactions, Aug. 1946. Vol. 42, No. 4.

"Investigation of Variation of Point Unit Thermal Conductances Along an Inclined Flat Plate" (M.S. Thesis on File in Engineering Library at U. C., Berkeley) R. M. Drake, 1946.

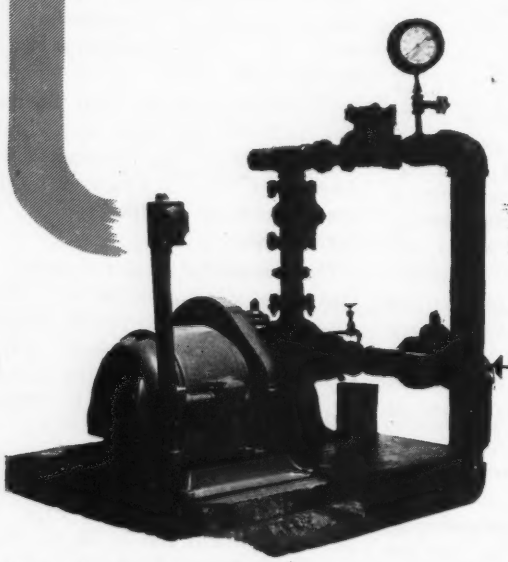
"Variation of Point Unit Thermal Conductance Around a Cylinder Normal to an Air Stream" (M.S. Thesis on File in Engineering Library at U. C., Berkeley) W. H. Giedt, 1946.

"Experimental Determination of Heat Transfer to an Oil in a Horizontal Pipe with Reynolds Moduli in the Transition Region" (M.S. Thesis on file in Engineering Library at U. C., Berkeley) F. E. Romie, 1947.

"The Analytical Prediction of Superposed Free and Forced Viscous Convection In a Vertical Pipe" by R. C. Martinelli and L. M. K. Boelter, U. C. Press, Berkeley and Los Angeles, California, 1942 Vol. 5, No. 2, pp23-58.

"Remarks on Isothermal and Non-Isothermal Air-Jet Investigations" by V. Cleeves and L. M. K. Boelter, AIChE (to be published soon).

"Science The Endless Frontier," Report to the President on a Program for Postwar Scientific Research by Vannevar Bush, Director of OSRD, July 1945. U. S. Government Printing Office, Washington, D. C., pp12-17.



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Evaluating Cooling Tower Performance for the Process Man

By James G. DeFlon
Chief Cooling Tower Development Engineer
The Fluor Corporation, Ltd.

The processes of cooling water are among the oldest and simplest known to man. All that is required to cool water is to expose its surface to air. Some of these cooling processes are slow, such as the cooling of water on the surface of a pond; while others are comparatively fast, such as the spraying of water into air. These processes all involve the exposure of water surface to air with varying degrees of efficiency.

The heat transfer process involves a latent heat transfer due to change of state of a small portion of the water from liquid to vapor and a sensible heat transfer due to the difference in temperature of water and air. Approximately a thousand BTU are required to evaporate one pound of water, which is the amount of heat lost in cooling 100 lbs. of water 10°. Therefore, for each 10° of cooling effected, roughly 1% of water is lost by evaporation. In addition, there will be a spray loss of not more than 0.2% in a well-designed atmospheric or mechanical draft tower. Water cooling from 120° to 90°, for example, will therefore lose 3.2% of its weight (3 plus .2%) with each passage through the tower.

In cooling towers in which the water is warmer than the air, the heat removed from the water and transferred to the air is the sum of the sensible heat and the latent heat of evaporation. The sensible heat q_s is small compared to the latent heat transferred, wr.

$$q_t = qs + wr$$
$$w = kA \Delta p_m$$

The factors which influence the performance of a cooling tower are therefore those which affect the expression $kA\Delta p_m$. The value kA depends on the construction of the equipment, the extent of water surface exposed through drop surface and filming surface, and the velocity of the air. Δp_m depends on the temperature of the water and the temperature and humidity of the air. Actually, Δp_m represents the difference in vapor pressure between the water at its temperature and the water if it were at the wet bulb temperature of the air.

It is evident from the above that the water cannot be cooled below the wet bulb temperature of the entering air. The wet bulb temperature, or to be more precise, the adiabatic saturation temperature, represents the minimum temperature that the water would reach with infinite time of contact between water and air in a cooling tower This must be kept in mind when designing a plant to operate on cooling tower water.

General Considerations

As process refinements have appeared, industry has demanded closer and closer control of its production units, resulting in more exacting demands being made upon cooling towers. In many plants, each additional degree of cooling has meant hundreds and even thousands of dollars per day in increased production. It has, therefore, been necessary for the cooling tower in-

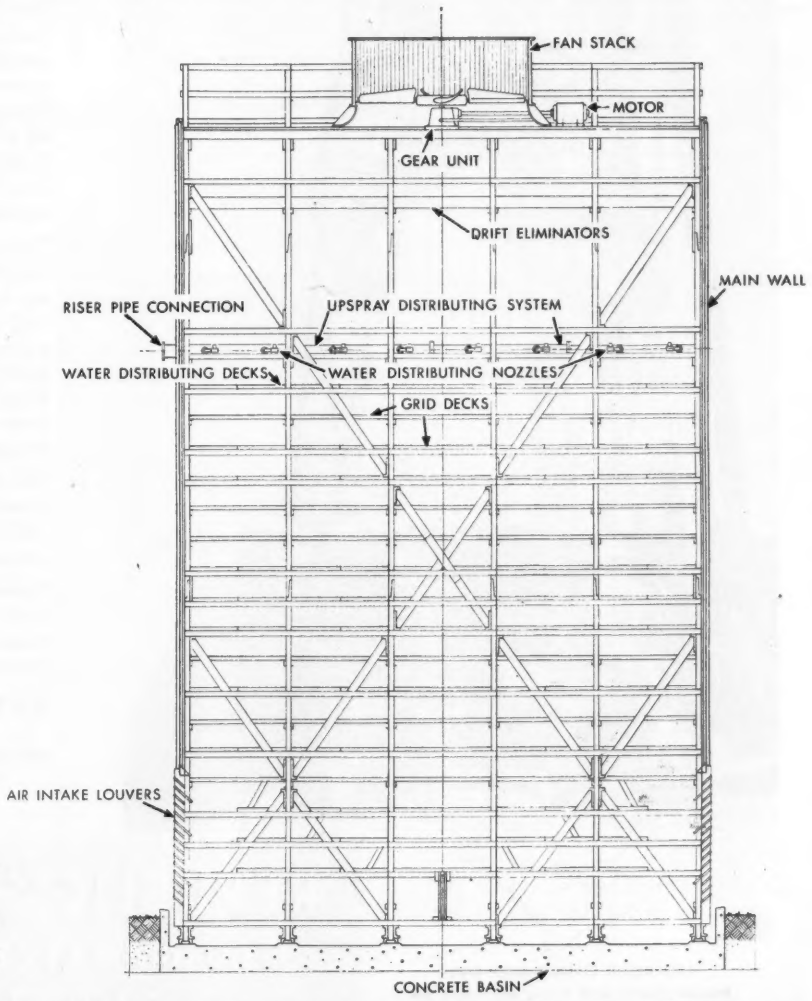
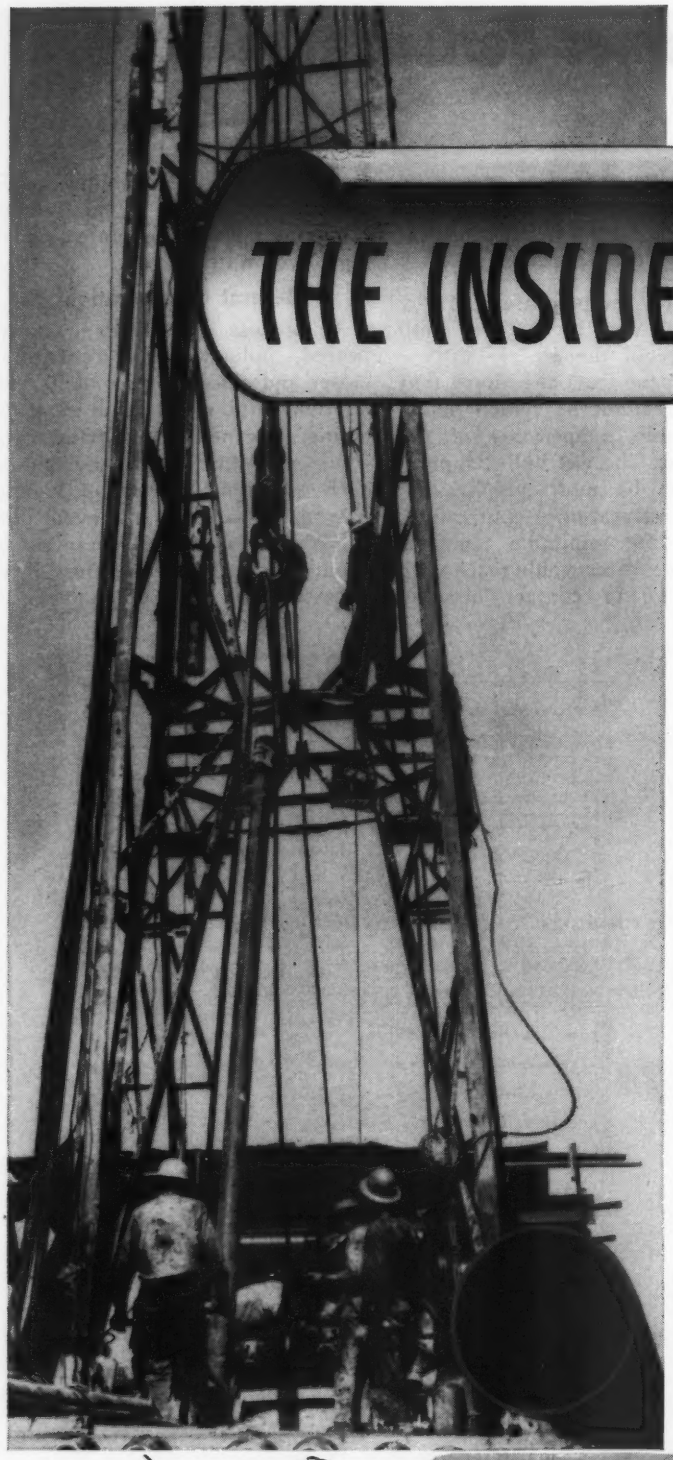


Fig. 1—Cross-sectional view of a mechanical draft cooling tower. With the upspray distributing system, it is necessary to allow sufficient space between the drift eliminators and the nozzles for a spray chamber.



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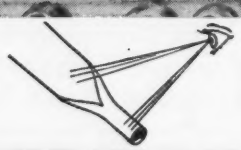

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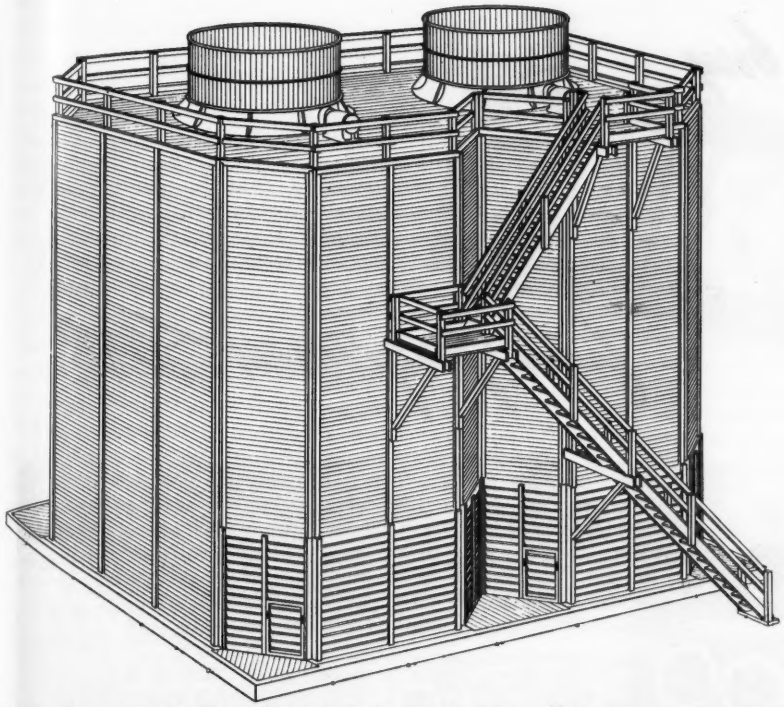

Fig. 2—A modern 2-cell mechanical draft cooling tower. Note the square corners have been removed to facilitate air distribution within the structure.

dustry to produce a tower which would supply the colder water more economically.

There are two types of cooling towers in general use today—the atmospheric (See Fig. 10) and the mechanical draft (See Fig. 2). The older apparatuses for cooling water, i.e., the spray pond and natural draft chimney towers, have been almost exclusively replaced by these two types of cooling towers. The objection to the spray pond is the limited performance available and the nuisance created by the high water loss occurring during certain seasons of the year. The objection to the natural draft tower is the high initial cost and the serious reduction in performance experienced during periods of hot weather. Both the atmospheric and the mechanical draft towers are capable of cooling water to the same minimum temperatures. The economic situation, the prevailing atmospheric conditions, the desired approach to the wet bulb temperature, and the amount of space available, will indicate which type to select.

Mechanical Draft Towers

There are two types of mechanical draft towers in use today—the forced draft and the induced draft. In the forced draft tower, the fan is mounted at its base and the air is forced in the bottom and discharged through the top at low velocity. In the induced draft tower, the fan is mounted on the roof of the structure and air is pulled upward and discharged at a high velocity.

The forced-draft type is fast losing favor as it is more often subjected to the recirculation of the hot humid exhaust vapors back into the air intakes than the induced-draft type. This occurs under certain atmospheric conditions because the velocity of the humid exhaust air is so low that the suction created by the fans tends to draw it back into the tower. Since the wet bulb temperature of the exhaust air is considerably above that of the ambient air, there is a decrease in performance evidenced by an increase in cold water temperature.

Except for the location of the fans, the structural and operational features of the two types of me-

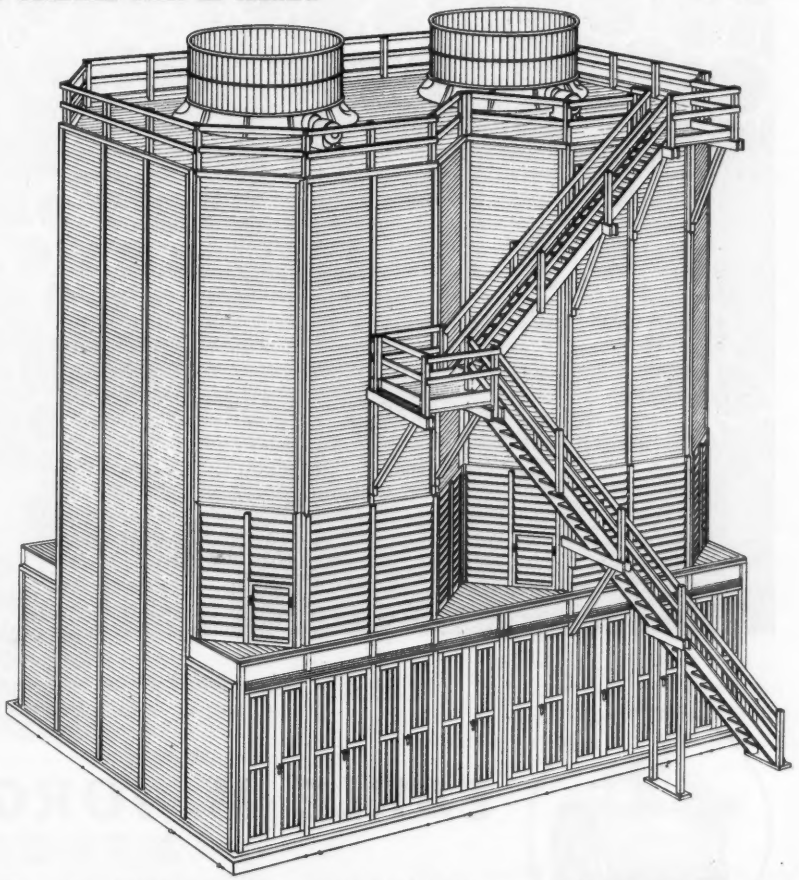

Fig. 3—Mechanical draft cooling tower placed over a coil shed. The tower is used to cool water which, in turn, is used to cool other water, gases or liquids circulated through the coils installed in the lower part of the tower.

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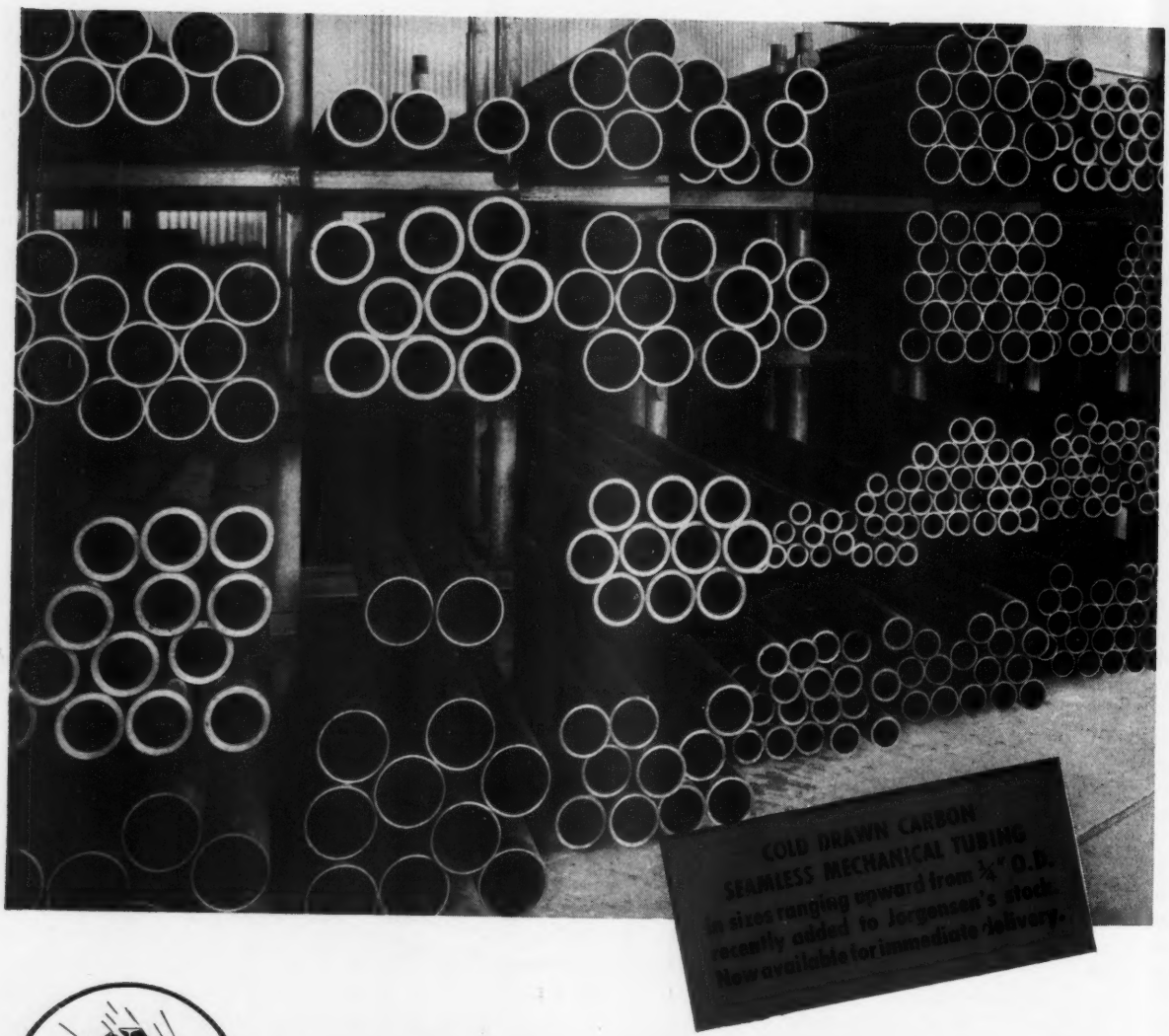
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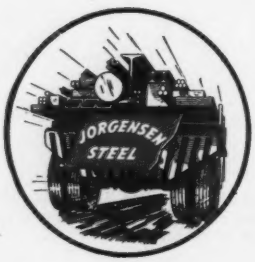

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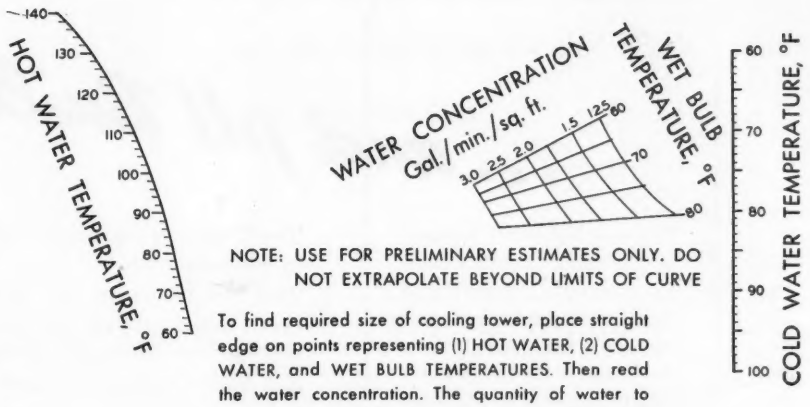
chanical draft towers are essentially the same. A cross-sectional view of the induced-draft tower with the various parts labeled is shown in Fig. 1. The entrained moisture is removed from the exhaust air by the draft eliminator, which is placed just above the spray chamber and below the fan. The water is pumped to the main header located in the top of the tower where it is distributed to the various nozzles. This water is sprayed up in a manner similar to that used in a spray pond and is intimately mixed with the exhaust air before dropping to the decks below. (In performance, the upspray distributing system represents the equivalent of adding 8 or 9 feet to the height of the cooling tower over that of the gravity-type system.) The fall of the water is interrupted by the slat-type grids as it flows counter-currently to the air. In flowing counter-currently, the coldest water contacts the driest air and the warmest water contacts the most humid air. Maximum performance is thus obtained since the temperature of all of the cold water is approaching the wet bulb temperature of the entering dry air. This was not true of the older cross-flow and parallel-flow type cooling towers.



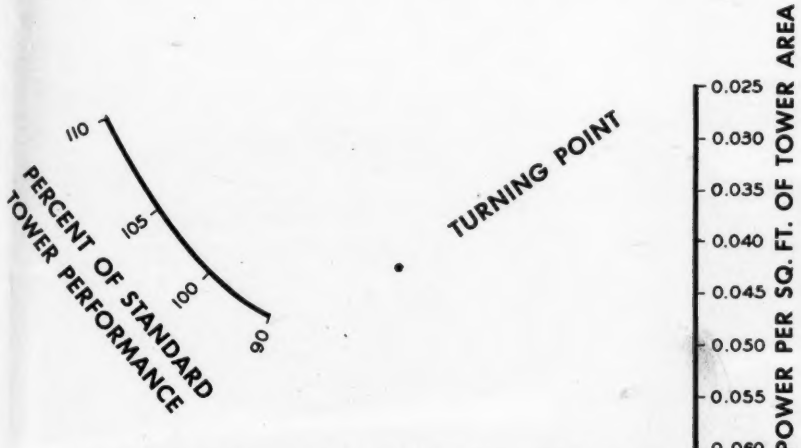
NOTE: USE FOR PRELIMINARY ESTIMATES ONLY. DO NOT EXTRAPOLATE BEYOND LIMITS OF CURVE

To find required size of cooling tower, place straight edge on points representing (1) HOT WATER, (2) COLD WATER, and WET BULB TEMPERATURES. Then read the water concentration. The quantity of water to be cooled divided by the water concentration, gives effective ground area of the cooling tower required.

Figure Performance curve of a Counter Flow, Induced Draft Cooling Tower with Upspray distributing system containing 24 ft. of filling.

Fig. 4—Mechanical draft cooling tower sizing chart.

The performance of a given type cooling tower is governed by the ratio of the weights of air to water and the time of contact between water and air. In commercial practice, the variation in the ratio of air to water is first obtained by keeping the air velocity constant at about 350 ft. per minute per sq. ft. of active tower area and varying the water concentration (gals. per minute per sq. ft. of tower area). As a secondary operation, the air velocity is varied to make the tower accommodate the cooling requirement. The time of contact between water and air is governed largely by the time required for the water to discharge from the nozzles and fall through the tower to the basin. The time of contact is, therefore, obtained in a given type of unit by varying the height of the tower. Should the time of contact be insufficient, no amount of increase in the ratio of air to water will produce the desired cooling. It is therefore necessary that a certain minimum height of cooling tower be maintained. Where a wide approach* of 15° to 20° to the wet bulb temperature and a 25° to 35° cooling range** is required, a relatively low cooling tower will suffice. A tower in which the water travels 15 to 20 ft. from the distributing system to the basin is sufficient. Where a moderate approach of 8° to 15° and a cooling range of 25° to 35° is required, a tower in which the water travels 25 ft. to 30 ft. is adequate. Where a close approach of 4° to 8°, with a 25° to 35° cooling range is required,



NOTE: USE FOR PRELIMINARY ESTIMATES ONLY

To find fan horsepower, place straight edge on % design tower capacity factor and turning point, then read fan horsepower per square foot of tower area at right. Multiply tower area by this factor to obtain fan horsepower.

Figure , fan horsepower curve for induced draft cooling towers with 24 feet of filling.

Fig. 5—Mechanical draft cooling tower horsepower chart.

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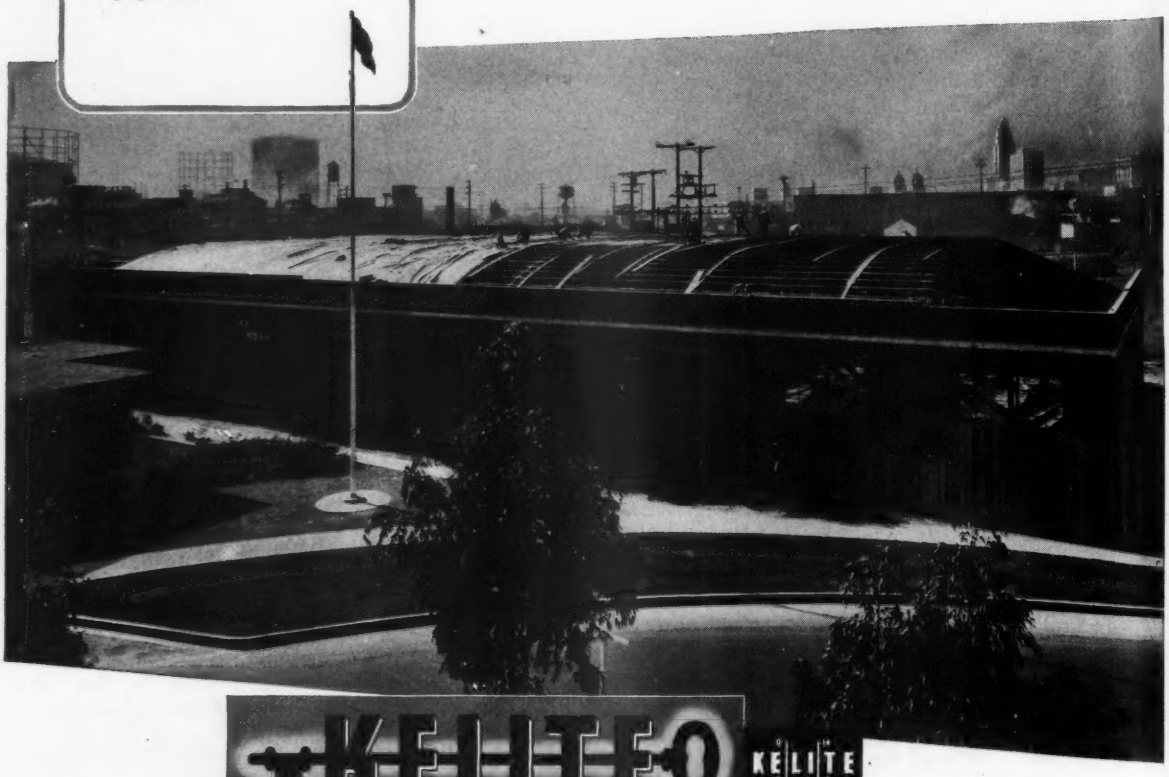

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a tower in which the water travels from 35 ft. to 40 ft. is required. It is usually not economical to design a cooling tower with an approach of less than 4°, but it can be satisfactorily accomplished with a tower in which the water travels 35 to 40 ft.

Figure 4 shows the relationship of the hot water, cold water and wet bulb temperatures to the water concentration. From this, the minimum area required for a given performance of a well-designed counterflow induced draft cooling tower can be obtained. Figure 5 gives the (horse power) H.P. per sq. ft. of tower area required for a given performance. These curves do not apply to parallel or cross-flow cooling since these processes are not as efficient as the counterflow process. Also they do not apply where the approach to the cold water temperature is less than 5°. These charts should be considered approximate and for preliminary estimates only. Many factors not shown in the graphs must be included in the computation and hence the manufacturer should be contacted for final design recommendations.

The cooling performance of any tower containing a given depth of filling varies with the water concentration. It has been found that the maximum contact and performance is obtained with a tower having a water concentration of 2 to 3 gallons of water per minute per sq. ft. of ground area. Thus, the problem of calculating the size of a cooling tower becomes one of determining the proper concentration of water required to obtain the desired results. A higher tower will be required if the water concentration falls below 1.6 gals. per sq. ft. Should the water concentration exceed 3 gals. per sq. ft., a lower cooling tower may be used. Once the necessary water concentration is obtained, the tower area can be calculated by dividing the gals. per minute circulated by the water concentration gals. per sq. ft. The required tower size then is a function of the following:

1. Cooling range (Hot water temperature minus cold water temperature).
2. Approach to wet bulb temperature (Cold water temperature minus wet bulb temperature).
3. Quantity of water to be cooled.
4. Wet bulb temperature.
5. Air Velocity through the cell.
6. Tower height.

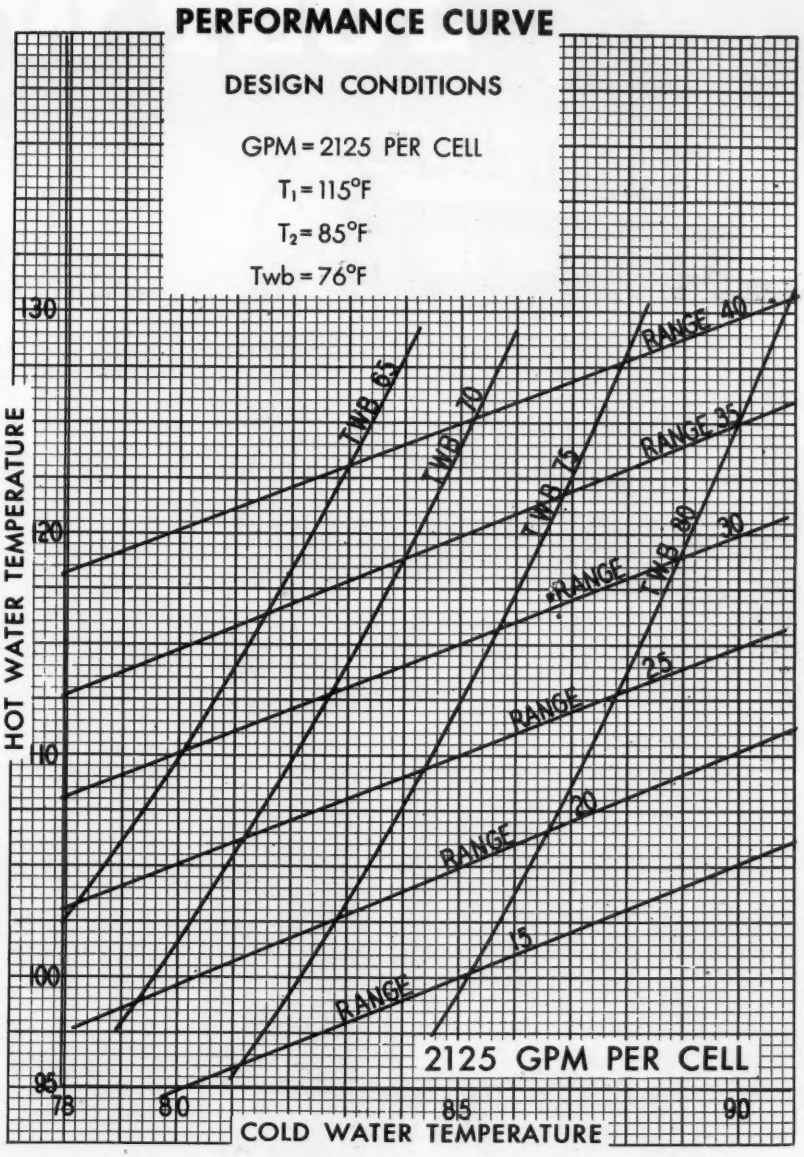


Fig. 6—Typical performance curve for a mechanical draft cooling tower.

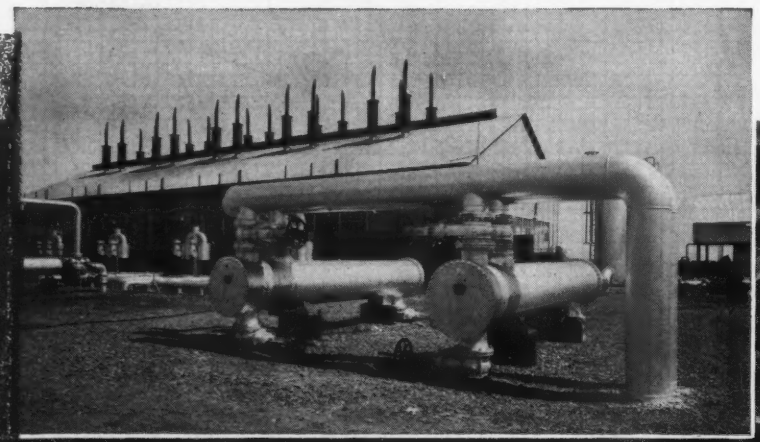
To illustrate the use of the charts let us assume that we have the following cooling conditions:

Hot water temperature = 102°
Cold water temperature = 78°
Wet bulb temperature (Twb) = 70°
GPM = 2000

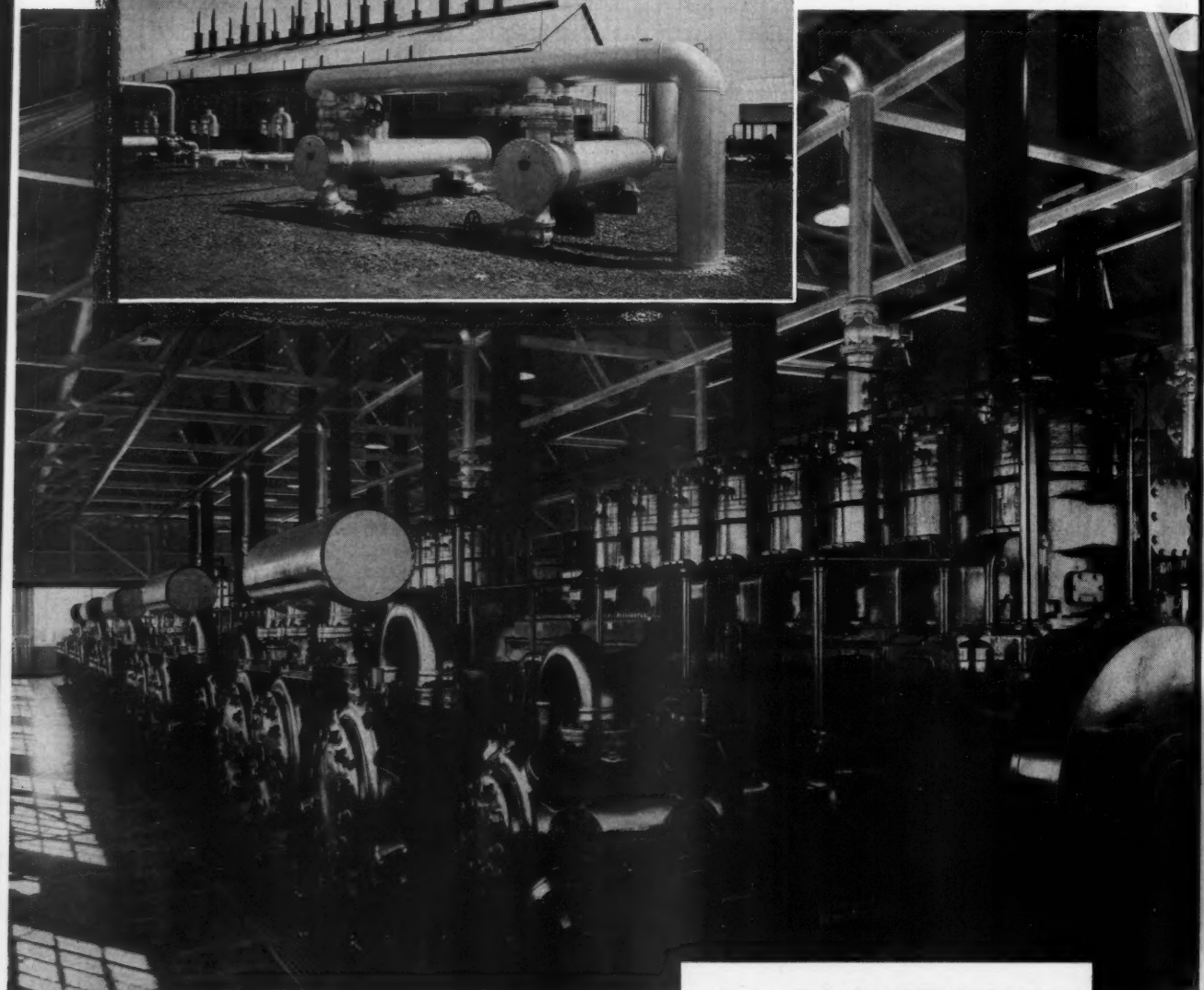
laying a straight edge across Figure 4 and connecting the points representing the design water and wet bulb temperatures, we find that a water concentration of 2 gals. per sq. ft. is required. Dividing the quantity of water circulated by the water concentration, we find that the theoretical area of the tower is 1000 sq. ft.

To obtain the theoretical fan horsepower, we use Figure 5. Connecting the points representing the 100% of standard tower performance with the turning point, we find that it will require .041 HP per sq. ft. of actual effective tower area. Multiplying by the tower area of 1000 sq. ft., we find that it requires

JUST WEST OF



Exterior view of compressor house at the McCar gasoline absorption plant. After natural gasoline extracted, residue gas is furnished to nearby co panies. (Photographed by Elwood M. Payne, Houst



Ten 8 cylinder (800 BHP) Clark Right Angle Gas-Engine-Driven Compressors give reliable operation at the McCarthy Oil and Gas Corporation gasoline absorption plant at Winnie, Texas.

41.0 fan horsepower to perform the necessary cooling.

Suppose that the commercial tower size is such that the actual tower area is 910 sq. ft. We can still obtain the cooling equivalent to 1000 sq. ft. of standard tower area by increasing the air velocity through the tower. Within reasonable limits, the shortage of actual area can be compensated for by an increase in air velocity through the tower which, in turn, requires a higher fan horsepower. Our problem then becomes one of increasing the performance of the smaller tower by 10%. From Figure 5, by connecting the points representing 110% of standard tower performance and the turning point, the fan horsepower is found to be .057 HP per sq. ft. of actual tower area, or .057 x 910=51.9 H.P.

On the other hand, suppose the commercial tower size is such that the actual tower is 1110 sq. ft., the cooling equivalent to 1000 sq. ft. of standard tower area can be accomplished with less air and less fan horsepower. By the use of Figure 5, the theoretical fan horsepower for a tower doing only 90% of standard performance is found to be .031 per sq. ft. of actual tower area or 34.5 H. P.

This illustrates how sensitive the fan horsepower is to small changes in tower area. The importance of designing a tower which is slightly oversize in ground area becomes immediately apparent.

Let's assume that we have the same cooling range and approach as used in the first example, except that the wet bulb temperature is lower. The design conditions would then be:

GPM = 2000
Range = 24°
Approach = 8°
T_1 = 92°
T_2 = 68°
Wet bulb temp.-(Twb) = 60°

From Figure 4, we find the water concentration required to perform the cooling is 1.75, giving a theoretical tower area of 1145 sq. ft. as compared with 1000 sq. ft. for a 70° wet bulb temperature. This shows that the lower the wet bulb temperature for the same cooling range and approach, the larger the area of the tower required and therefore the more difficult the cooling job.

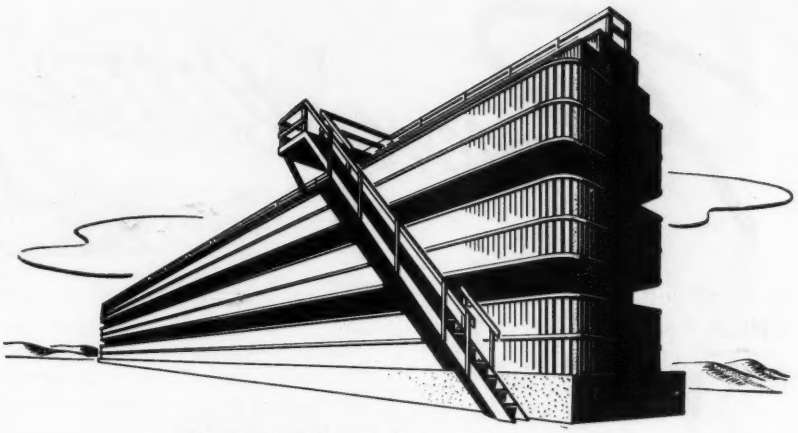


Fig. 10—Typical atmospheric-type cooling tower.

The problem of estimating the performance of an existing tower at other than design conditions is often encountered by the plant operator. For example, suppose we have a tower that was designed for the following conditions:

GPM = 1000
Range = 30°
Approach = 10°
T_1 = 110°
T_2 = 80°
Wet bulb temp. = 70°

What will the cold water temperature (T_2) be when the wet bulb temperature (Twb) drops to 60°, providing of course, that the heat load and water quantity remain constant? From Figure 4, we find that the water concentration at 2.0 and per sq. ft. at design conditions. This water concentration does not change since the volume of water and the tower area remain constant. With the water concentration at 2.0 and the wet bulb temperature at 60°, by adjusting the angle of the straight edge on Figure 4 until we obtain a 30° differential between the hot water and cold water temperatures, we find the hot water temperature to be 103°, and the cold water temperature to be 73°.

Suppose now, that the above designed tower had 1500 GPM flowing through it, and the total heat load remained constant, what would the cold water temperature be when the wet bulb temperature is 65°? The design heat load was

1000 x 8.33 x 30 = 250,000 BTU per minute.

The new cooling range (heat load remaining constant) when circulating 1500 GPM over the tower would be

$$\frac{250{,}000}{1500 \times 8.33} = 20.0°$$

Theoretically, the design area of the tower from Figure 4 was 500 sq. ft. (1000 GPM ÷ 2.0 gal. per sq. ft. = 500 sq. ft.). The water concentration when circulating 1500 GPM is

$$\frac{1500}{500} = 3.0 \text{ gal. per sq. ft.}$$

Now, referring to Figure 4, with a water concentration of 3.0 gal. per sq. ft. and 65° wet bulb temperature, adjust the straight edge until a difference of 20° exists between the hot water and cold water temperatures. This shows the hot water temperature to be 100° and the cold water temperature to be 80°.

This indicates that the possibility of a lower cold water temperature obtained by the lower existing wet bulb temperature was lost due to the adverse effect of the increased water quantity.

Figure 6 shows the type of performance curve furnished by the cooling tower manufacturer. This shows the variation in performance with change in wet bulb and hot water temperature, while maintaining the water quantity constant.

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*The approach is the difference between the cold water temperature and the wet bulb temperature.

**The cooling range is the difference between the hot water temperature and the cold water temperature.

Personalities IN THE NEWS

E. R. Millett, Jr., New CNGA Secretary

The appointment of E. R. Millett, Jr., to the office of Secretary-Treasurer of the California Natural Gasoline Association was anounced by M. W. Kibre, Association president. Millett takes over the office made vacant by the resignation of George L. Tyler, CNGA secretary-treasurer for the past nine years. He is a graduate of Pomona College and brings to CNGA a valuable background of experience in the petroleum industry and in organizational work.

E. R. Millett, Jr.

Millett is a veteran of World War II, having served with the Army in Japan and Korea. He was honorably discharged from the service as a Captain in December 1946.

For ten years prior to the war he was in business as a consulting petroleum engneer, working on drilling and production problems in California and Oregon. This was preceded by three years' experience with the Union Oil Company and one year with Martin Van Couvering.

While working as a consultant he also found time to serve a year as president of the Venice Lions Club; two years as president and five years as a member of the Board of Directors of the Venice Branch of the Los Angeles Chamber of Commerce; and as a member of Mayor Bowron's committee investigating the Los Angeles sewage disposal problem. He is the organizer of the Shoreline Planning Association, a state wide organization whose purpose is the preservation of the State's beaches and the construction of beach highways.

Death Takes S. Clyde Kyle

His numerous friends were saddened to learn that Mr. S. Clyde Kyle of The Pelton Water Wheel Company, died suddenly in Bakersfield recently.

Mr. Kyle was best known in the oil fields for his part in the development and introduction of the Pelton Jack, used for hydraulic pumping of oil wells.

After spending the earlier years of his life in various endeavors, including a yacht-building business of his own in '28 and '29, Mr. Kyle had decided that he could design a successful hydraulic jack. In 1939 he took his ideas to The Pelton Water Wheel Company of San Francisco, which agreed to develop and market the product. From that time until 1945, he was engaged in development and refinement work with the Pelton engineering staff.

In 1946, he transferred to sales work, and it was on one of his sales trips to the Bakersfield area that he was stricken.

Paul Joins Ex-Marine Engineers

Appointment of John Paul, one of the best known Safety Engineers in the United States, as Safety Engineer of Ex-Marine Guards Company, was announced recently by Ralph E. Davis, head of the Company. Mr. Paul will direct the safety consultation program which Ex-Marine Guards furnish to large plants throughout California.

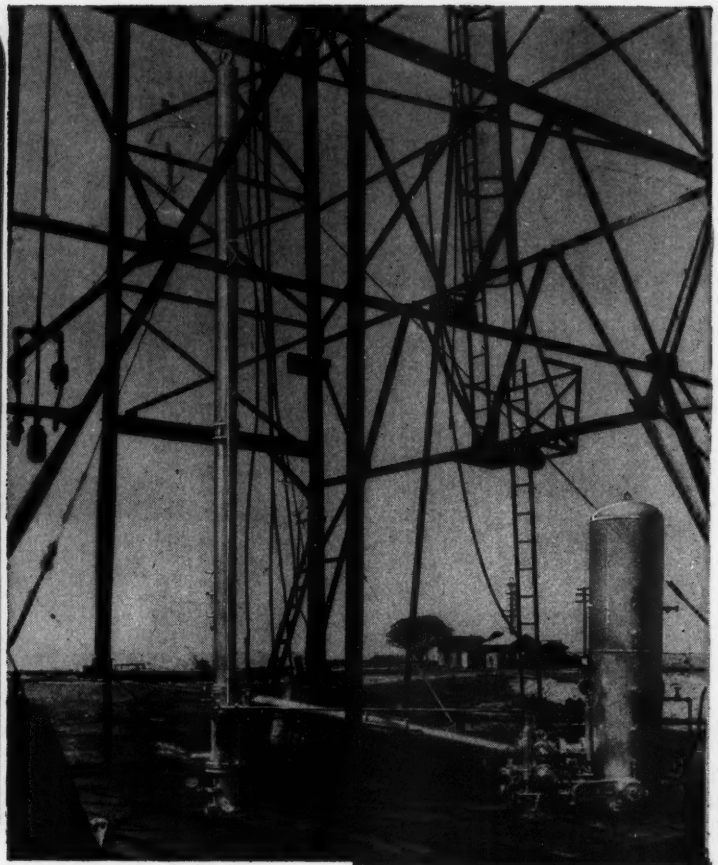
Mr. Paul brings to his new position a wide backround of safety engineering experience. He was consulting Safety Engineer, United States Department of Labor, Division of Labor Standards; and is Vice-President of the Aircraft Manufacturer's Safety Council. Since 1943

John Paul

he has been an instructor in Safety Engineering at the University of California, and is a charter member of the Greater Los Angeles Chapter American Society of Safety Engineers. He is a member of the Southern California Industrial Safety Society, the National Safety Council, and the National Association of Power Engineers and has had broad experience with the engineering departments of large companies such as, Lockheed Aircraft Corporation, Firestone Tire and Rubber Company, Consolidated Edison Company, and others.

FIVE-YEAR tests PROVE this LONG-STROKE Hydraulic JACK for Deep-Well Oil Pumping

1. Lowers Lifting Costs
2. Is More Reliable



Prime Mover May Be Gas Engine or Electric Motor.

Three major California oil companies said, "PROVE IT"—that this completely-fluid-operated jack will give more oil production from deep wells at less cost.

So The Pelton Long-Stroke Hydraulic Jack went to work and did lift more oil, 24 hours every day—because of *the long, constant-velocity stroke.*

After 5-year tests of continuous operation, it was demonstrated that bottom-hole equipment lasts far longer because of fewer *rod reversals*—which also greatly cut time-out for bottom-hole maintenance, resulting in still greater production and lower lifting costs. Meanwhile, The Pelton jack showed practically no wear.

Designed and built by The Pelton Water Wheel Company whose hydraulic engineering is acclaimed the world over for reliability, *these jacks need no pampering.* They have automatic safety features, easy stroke-length selection, portability and trim appearance. You will be convinced and you will prove to your company that old methods of deep-well pumping waste money, while The Pelton Long-Stroke Hydraulic Jack is *simple to operate* and does increase production at less cost.

Yes, it's built by

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Write for completely-illustrated technical BULLETIN No. 33 showing detail applications of The PELTON LONG-STROKE HYDRAULIC JACK for pumping more oil at lower costs from deep wells.

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BLW THE BALDWIN GROUP

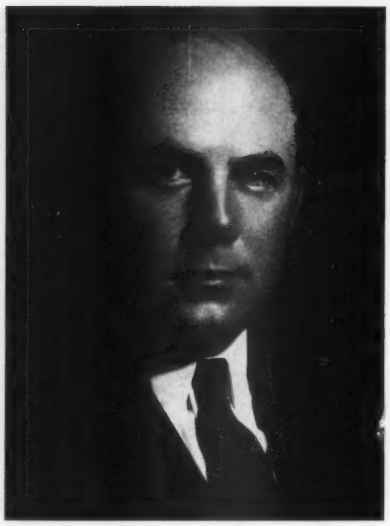
California Oil Men Named to IPAA Committees

The Independent Petroleum Association of America has announced the appointment of prominent independent California oil men to positions on standing committees of the organization. B. A. Hardey of Shreveport, Association President, has announced Executive Committee approval of committee appointments, according to advice received from Executive Manager C. E. Buchner of Tulsa, national headquarters for the organization of independent oil and gas operators.

C. A. Johnson, President of Holly Development Company, Los Angeles, who is vice president of the Association for Southern California has been named to the Membership Committee. C. C. Spicer, President, Republic Petroleum Company, Los Angeles, has been made a member of the Resolutions Committee and serving with him is Ralph B. Lloyd, President, Lloyd Corporation, Ltd., of the same city.

Also of Los Angeles, L. L. Aubert, General Manager of Bankline Oil Company, has been named to the Nominating Committee; R. E. Havenstrite, R. E. Havenstrite Oil Company, has been made a member of the Interstate Oil Compact Commission Committee; and Lawrence Vander Leck is a member of the Supply and Demand Committee.

Other operators of the state named to committees of the nation-wide Association of independent oil and gas operators include A. J. Crites, Maricopa, Manager of Anchor Oil Company, vice president of the Association for the northern California region who is serving on the Membership Committee. W. L. Holloway of San Francisco has been named to a special committee making a study of and to recommend rules and regulations affecting the administration of the recently approved Public Lands Lease Bill; and A. C. Mattei, President of Honolulu Oil Corporation; also of San Francisco, is serving on the Natural Gas Committee of the Association. John W. Hancock, Vice President of The Hancock Oil Company of California, Long Beach, has been made a member of the Budget and Finance Committee. Tenure of office is for a period of one year.



George T. Tyler

Tyler Joins Du Pont Organization

Announcement has been made of the resignation of George L. Tyler as Secretary-Treasurer of California Natural Gasoline Association to join the Petroleum Chemicals Division of E. I. Du Pont de Nemours & Company, Inc. He will be assigned to the Los Angeles district after a short period to be spent in the Company's Wilmington office. Tyler leaves CNGA April 1st after nine years with the Association, during which time the group has enjoyed steady growth in membership and has received wide recognition for the work it is doing in its particular field.

Nomads March Meeting

Behind the scenes in baseball was the subject discussed at the regular monthly dinner meeting of the Los Angeles Chapter of NOMADS held at the Jonathan Club in Los Angeles, Wednesday evening, March 12th. The new president, Bob Eiche, presided over the meeting and read the appointments of committees which will carry on the work during the year. The main committees appointed were:

Membership — Ernie Fowks (Chairman), Fred Tyler and Web Wilson; Ritual — Fred Ripley (Chairman); Entertainment—Lee Laird (Chairman), Earle Boggess, and Joe Schlarb; Reception for Foreign Visitors — Henry Pullman (Chairman); Housing—Tom Martin (Chairman), C. F. Van Loozen and Harold C. Clark; Roster—Bill Bettis (Chairman).

The main speaker of the evening was John (Beans) Reardon, big league umpire. Following him was another umpire, Al Barlick and an ex-pitcher, Larry French. With much ribbing of each other, these three told some interesting tales of happenings in baseball during the past years.

Foreign guests at the meeting were: Charles M. LaMar of Barnsdall Oil Company of Venezuela; S. J. Liu and C. K. Suez of the Chinese Petroleum Corporation; Guy F. Harvey and Harry D. Huskey of Iraq Petroleum Company.

Speaker of evening, John "Beans" Reardon.

Demond Heads Stripper Assn.

Election of Earle F. Demond, well known California independent oil man, to the presidency of the California Stripper Well Association was announced on April 1. The election took place at the annual meeting of the board of directors of the state-wide independent oil trade group held in Los Angeles.

V. L. Norman, general manager of Woolner Oil Corporation, Ltd.; L. A. Donnelly, vice president of Exeter Oil Company, Ltd.; and Edwin P. Crail, president of Victory Oil Company, were elected as vice presidents; Thomas H. Work, of Nordon Corp., Ltd., was re-elected secretary-treasurer; and Richard Fenton, executive vice-president of the association since its organization, was likewise re-elected.

Demond, the new president of the stripper oil well group, succeeds V. R. G. Wilbur, who served as head of the organization for the past year. The newly elected official is a resident of Los Angeles, in which city he was born. He is the first native Californian to become head of the organization of stripper well operators. A graduate of Stanford University, with a degree in chemical engineering, Demond has been engaged in the petroleum industry for approximately 25 years. While still a student at Stanford, he worked as a roustabout, derrickman, and pumper for the Associated Oil Company. Before and after his graduation from Stanford he was employed in the refinery department of the General Petroleum Corporation, following which he became identified with Standard Oil Company's Sales department. Later Mr. Demond joined Carl von Bibra in the formation of the Exeter Oil Company, Ltd. and has been an officer of that company since its formation. He recently relinquished his active participation in the general management of the Exeter Oil Company, Ltd. but retains his position as Vice President.

Earle F. Demond is a member of the University Club and is active in Boy Scout activities in his community, currently serving as Chairman of the Advancement Committee in the Wilshire District. His principal hobby is swimming and his three daughters and son are all proficient at this sport also.

Earle F. Demond

Newly elected directors of the California Stripper Well Association chosen to serve with Earle F. Demond for the ensuing year are Fred I. Barkis, Selbar Oil Company; William H. Cree; Walter Everts, Jr., Dumm Bros. Petroleum Corp.; Felix Mallon; Karl P. Neilsen, Neilsen Pump Division of Oil Well Supply Co.; Fred O'Brien, Emerald Oil Company; L. R. Schenck, Oil Investments, Inc.; Joseph C. Shell, Royal Petroleum Company; R. M. Stephens, Stephens Petroleum Company; and R. H. Thompson, Royalty Service Corp. Directors re-elected to office were: George F. Brayton; Edwin P. Crail, Victory Oil Company; Robert C. Davis, Davis Investment Co.; Chester F. Dolley, Atlantic Oil Company; L. A. Donnelly, Exeter Oil Company, Ltd.; D. W. Elliott; Richard Fenton; Wilbur B. Harrison, Apex Petroleum Corp.; Jack Herley, Herley-Kelley; A. S. Johnston, A. S. Johnston Drilling Corp.; A. W. Lyddon, West American Oil Co.; Decatur Mitchell, Coast Supply Company; V. L. Norman, Woolner Oil Corp. Ltd.; Milton H. Philleo, Estate of Louise E. Dabney; E. W. Randolph, Century Oil Company; O. M. Slosson; V. R. G. Wilbur; Lloyd M. Willis, D. D. Dunlap Oil Co.; Thomas H. Work, Nordon Corp., Ltd.; and Chester F. Yunker, Del Amo Estate Company.

Fred H. Hammer, veteran oil and land man, currently is identified with development operations of Continental Northern Corp. and Continental Southern Corp. in the Long Beach area.

LeRoy Edwards, president of Pacific Lighting Corp. and an official of a number of other natural gas organizations, has returned to Los Angeles from New York. It was a combined business and pleasure trip.

News recently has featured Mike and Dickie, sons of Joseph P. Ensch, of Shell Oil's industrial relations and personnel department. Mike, only nine years old, was a star of Los Angeles' swimming training program. Among other things he can swim 150 yards and dive from the 12-foot board. Dickie, seven, was the choice of his school to appear on the House Party radio program, sponsored by General Electric.

W. L. Spencer, Union Oil, has been appointed chairman of arrangements for the meeting of the API lubrication committee in Los Angeles May 20-21. H. S. Merriman, Socony-Vacuum Oil, New York, has been named chairman of the program committee.

E. R. Raphael, Shell's Southern California division manager, has been elected a director of the All-Year Club of Southern California.

Credit for Seaboard Oil's evident discovery at Bacon Hills is generally given to L. S. Chambers and Al Vitt, who worked out geology.

A recent visitor at the Hancock Oil plant in Long Beach was R. D. Lowe, vice president and general manager of Elk Refining Co., Charleston, West Virginia. Elk Refining is one of the oldest Pennsylvania lubricating oil refiners and suppies base stock for Hancoco Pennsylvania oil.

Robert E. Snyder, Robert W. Hulwider and Louise McPherson have organized the Snyder Oil Tool Corp. in Los Angeles for the express purpose of controlling their patented and distinctive oil tools. The company has under consideration the building of an experimental machine and testing shop.

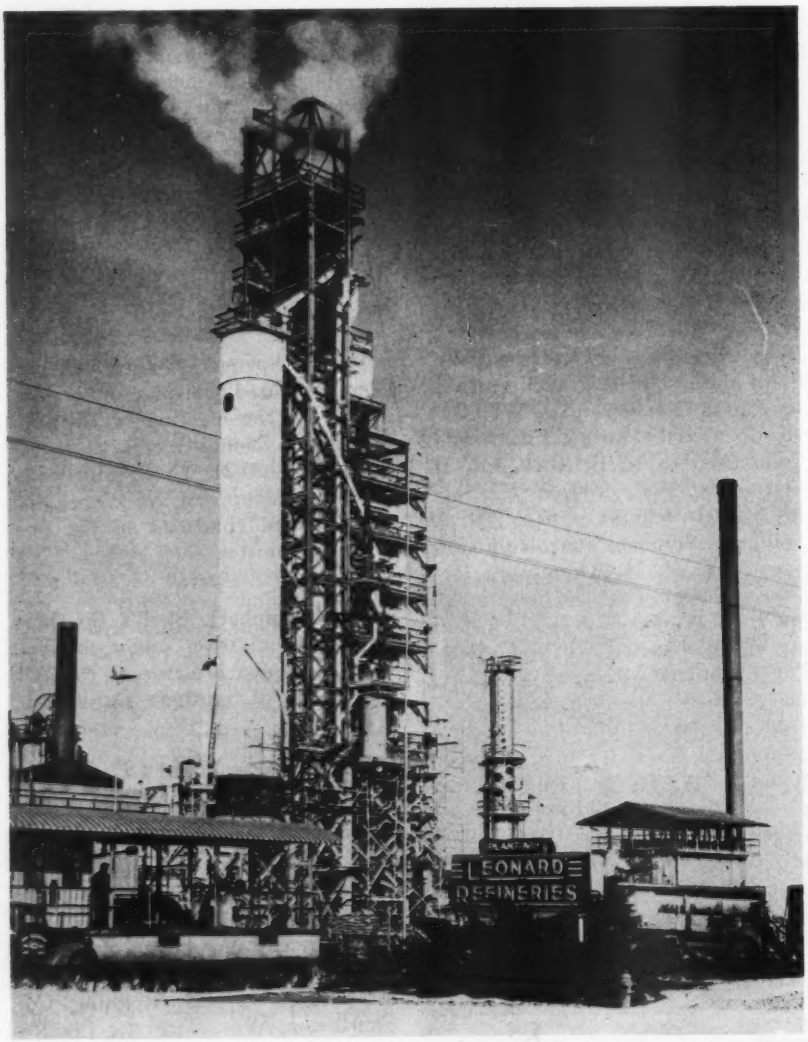
George F. Sicks, former Army engineer, who divides his time between Los Angeles and San Simon, Arizona, has leased a portion of his San Simon property for an oil test sponsored by Clifford E. Haines. Sicks is the owner of a large cattle ranch near the town.

Harry Ransford, genial public relations expert for Signal Oil & Gas, is back in Los Angeles from a short stay in San Francisco, where he was in attendance at the meeting of the advertising group of the public relations committee of the API.

Gladys Uden, eye-arresting receptionist for Bolsa Chica Oil Corp. is one gal who believes in early planning for vacation days. She has already picked her summer holidays for Oak Park, Illinois, her hometown and one of Chicago's most beautiful suburban communities.

Grover Cleveland Alexander, one of the great major league baseball pitchers of the past, currently is a guest of Bill Lanzer, sales manager for Socal Oil & Refining Co. in Los Angeles. The slab artist and Lanzer have been friends for more than a quarter of a century.

Ralph K. Davies, formerly vice president of Standard of California, and during the war Deputy Petroleum Administrator, is head of the recently-organized Trunkline Gas Supply Co.



The first post-war catalytic cracker, designed to meet the competitive needs of the small refiner, went on stream at Leonard Refineries, Inc., Alma, Michigan, March 18. Licensed and engineered by Houdry Process Corporation, it was built by Houdry's subsidiary, Catalytic Construction Company.

Beach City Well Program

Further oil exploration is planned by Calumet Gold Mines Co., with Huntington Beach tentatively selected as the location for several drilling jobs. At a special meeting of the company, U. J. Apple was elected president, Louis Chappuis, vice president, and E. V. Suess, secretary-treasurer.

Whittier Try Working Over

Sanding up after being placed on the pump, Atlas Production, Inc., Community No. 1-2 in Sec. 17-2s-11w on Citrus Grove Heights in the Whittier area is now engaged in cleanout activities.

Chino Well Put On Pump

Grayco Oil Co. has turned to tanks its No. 1 well in Sec. 13-3s-8w near Chino, San Bernardino County, for an unestimated yield on the pump. Total depth is 4250 ft., with casing set at 3164 ft. The test is southeast of the old Mahala No. 1, which years ago produced in quantity.

Whittier Job Ends Oil Hunt

In the vicinity of Pellissier and Workman Mill Roads, Bradford Bishop's Baldwin No. 1 in Sec. 3-2s-11w north of Whittier has ended a search for new oil at a total depth of 3627 ft. Nothing of interest was reported.

Field Development

PREPARED FROM CALIFORNIA OIL WORLD NEWS SERVICE

Los Angeles Basin

Beach Organizations Complete 25 Producers

An enviable record has been established by Continental Northern Corp. and Continental Southern Corp. during the past year.

During the 12 month period these organizations together have completed 25 wells, bottomed in the central business district of Long Beach. According to an official announcement, these producers have accounted for more than 1,000,000 barrels of crude oil.

Surface installations are on the west bank of the flood control channel in the Long Beach Harbor industrial district. The wells are slant drilled to the east and in a number of instances bottomed more than half a mile distant from derrick site.

The slant drilling campaign has made possible recovery of oil in quantity from zones beneath the residential and business sections without depressing surface values.

Another well is nearing the completion stage, with permits already granted for the drilling of five more jobs, which will be bottomed west of Pine St. The two companies are winding up the leasing of ground in the district south of Sixth St. and as far east as Alamitos Ave.

Newhall-Potrero Exploratory Scene

A development campaign of much interest is beginning on General Exploration Co.'s 532-acre Ferguson lease in the Newhall-Potrero area.

The company has entered into an operating agreement with Union calling for joint development of the

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property in Secs. 26 and 31-4n-16w on the southeast flank of the Newhall-Potrero field. Roads are being graded for a deep test in Sec. 36. It will seek production in the lower sands opened up by Barnsdall Oil Co., northwest of the Ferguson lease.

Union is reported to have obtained a half interest in the Ferguson property, formerly held by C. G. Willis.

Chatsworth Wildcat Will Install Big Rig

Walter R. Mack's Lassen No. 1 wildcat test north and east of the Reservoir in the Chatsworth area of Los Angeles County has suspended operations at 1400 ft., preparatory to installing heavier equipment. Location falls in Sec. 14-2n-17w.

Los Angeles Try Gives Up

C. G. Willis' Butler Comm. No. 1 in Sec. 14-2s-12w near the intersection of Washington Blvd. and Maple Ave. in the East Los Angeles district has been abandoned at a total depth of 6240 ft.

West Pico Job Tested

On formation test, Premier Petroleum Corp.'s Carla No. 1 in Sec. 8-2s-11w in the West Pico sector of the Whittier area recovered water, mud and some oil. The venture cored oil sand from 5990 to 6210 ft. and now is in the process of changing to heavier outfit to deepen to more conclusive depths.

El Toro Try Grades

On Block 174 of the Irvine Survey, Morton & Sons are grading ground for Irvine No. 174-1, a wildcat test in Township 6s, Range 8w in the El Toro area of Orange County. Drilling contract has been let to K. L. Kellogg & Sons.

Long Beach Well Deeper

Shell Oil's Dolley No. 2 deep test in Sec. 29-4s-12w in the Long Beach field is drilling on down below 8500 ft., after running electric log.

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Alondra Well Drilling Out

British-American Oil Producing and Texas Co. have drilled out to 9093 ft. with Bodger No. 3 well in Sec. 22-3s-14w in the Alondra Park area, preparatory to a water shutoff trial. Total depth is 9142 ft. The well is one location northeast of the discovery. It has cored oil sand, but evidently in no great amount. Lack of success at present depth may call for carrying the hole on down.

Potrero Job Going Ahead

Basin Oil Co.'s City of Inglewood No. 1 test in Sec. 28-2s-14w in the Potrero area is exploring ahead at 6900 ft. Tom Pike is the contract driller.

Placentia Test Coring On Down

Tide Water Associated, Community No. 12-1 in Sec. 30-3s-9w in the Placentia area, Orange County, is coring near 3275 ft. Royalty Service Corp., meanwhile, is rigging for its No. 1 well in Sec. 36-3s-10w. The company has acreage in Secs. 35 and 36.

Inglewood Job Listed

Cleveland Oil Co., which recently completed its No. 5-A on its 20-acre Machado lease in the Inglewood area, is drawing plans for another drilling job there. The new well flowed 250 barrels daily through a 16/32-in. bean from the interval of 7920-8255 ft.

Riverside Try Fishes

In the Temecula area of Riverside County, Palomar Petroleum Co. is fishing drill pipe in its Tyrell No. 1 in Sec. 13-8s-1w, with hole bottomed at 2021 ft.

Standard Tests Del Valle Area

Northeast of the Del Valle field Standard of California is prospecting ahead at 6500 ft. with Boobier No. 1, a wildcat in Sec. 15-4n-17w. German Comm. No. 1 in Sec. 11-3s-11w in the Leffingwell area is spot coring and drilling ahead at 7510 ft.

The company's Six Co. Fee No. 3 in Sec. 2-3s-15w northwest of El Segundo is coring schist conglomerate at 7120 ft. No. 1 in the section has been placed on the pump at a redrilled depth of 6941 ft. for a yield of all water to sump.

Brea-Olinda Well Comes In

Union Oil has brought to successful conclusion its Naranjal No. 19 on the Stearns lease in Sec. 7-3s-9w in the Brea-Olinda area. The well last was reported good for 265 barrels of net oil a day, along with 21,000 cubic ft. of gas.

Los Angeles Try Pulling

Richfield Oil's U. P. Unit No. 4 in Sec. 16-2s-12w at East Los Angeles is pulling tubing, with bottom at 8490 ft. Location has been staked for Edison No. 2 on the section.

San Joaquin Valley

Bacon Hills Project Tests

In the Bacon Hills area of Kern County Seaboard Oil Co. is ready to again run water shutoff test of its Seaboard-Bandini No. 3-21 in Sec. 21-28s-20e. The test is centered on casing spliced to 427 ft. of liner and landed on top of plug at 7925 ft. Total depth is 8477 ft.

The project to date has given every sign of a discovery of some moment. It is located six miles north of Cymric, four miles west of South Belridge and three miles southeast of the Layman pool.

Cuyama Wildcat Plans Deepening

Oilwell Abandonment Co. is preparing to deepen from 1752 ft. its Cuyama No. 1 test in Sec. 25-11n-28w in the Cuyama area of San Luis Obispo County.

Coalinga Try Running Pipe

The Sharples Corp. is ready to run casing in its Hyde No. 1 explorer in Sec. 6-19s-16e in the Northeast Coalinga area in Fresno County. The well is bottomed in siltstone near 8900 ft.

Edison Project Disappointing

On formation test of the interval of 3995-4025 ft., Union Oil's Porter No. 74-28 in Sec. 28-30s-29e west of the Edison field recovered mostly water. Total depth is 4730 ft.

Middle Dome Test Fishing

Standard of California continues to make progress in recovering fish still remaining in bottom of its No. 73 in Sec. 30-23s-19e in the Middle Dome area of Kettleman Hills. So far some 60 ft. has been recovered, with top at 10,969 ft. Total depth is 12,389 ft.

Standard shares interest in the project with Bolsa Chica Oil Corp. Relative to the company's interest in the Middle Dome area, Thomas W. Simmons, Bolsa Chica president, said in a recent statement to stockholders:

"While many conflicting rumors are prevalent with reference to Standard of California's test in the Middle Dome area, in which this company has a substantial interest, we may say that the failure of the well to continue production was due to mechanical conditions existing as the result of failure to recover 1400 ft. of drill pipe remaining in the hole at the time it was put on production. This resulted in inability to land a protective liner and during production the open hole became plugged. Standard currently is attempting to recover pipe so as to make a normal completion."

Race Track Test Coring

British-American Oil Producing and the Capital Co. last were reported coring ahead at 4836 ft. with Portals No. 23-3 in Sec. 3-30s-29e in the Race Track Hill area. On formation test of the interval of 4742-4784 ft. a moderate gas blow ensued along with recovery oil gas-cut mud, water and high gravity green oil. General Petroleum is making hole ahead at 1037 ft. with Cooney No. 55-34 in Sec. 34-29s-29e.

Mountain View Wildcat To Test

Hancock Oil Co. is ready to run formation tester in its Di Giorgio No. 1 in Sec. 4-31s-29e in the Mountain View area, with hole bottomed in schist at 6348 ft. Bender Drilling Operations, B. A. Co. No. 1 in Sec. 29-30s-29e is drilling below 5550 ft.

Jasmine Explored

Two miles west of Pacific Oil & Gas Development's discovery well, Superior Oil is drilling its Quinn No. 51 in Sec. 20-25s-27e in the Jasmine area at 3225 ft. Pacific Oil's Cantleberry No. 83-22 in Sec. 22-25s-27e is prospecting on down at 2087 ft.

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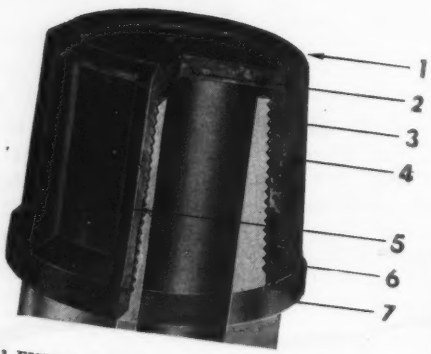

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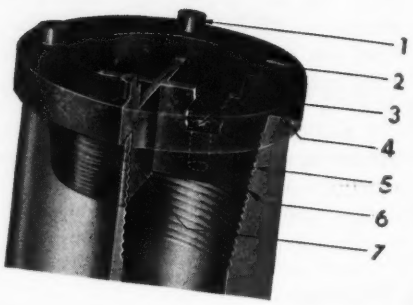

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Union Oil Adds Coastal Producers

Union Oil has just added four new pumpers in the Coastal district.

Bell No. 28 in Sec. 36-9n-33w and Bell No. 53 in Sec. 27 in the Cat Canyon field have been completed at respective depths of 5487 and 5762 ft. for 500 and 495 barrels of oil a day. Purisima No. 40 in the Lompoc area has been finished at 2678 ft. for 295 barrels daily.

Torrey No. 72 in the old Torrey field is pumping 190 barrels a day, after going to a total depth of 2275 ft. Drill site is in Sec. 5-3n-18w.

Butte County Deepening Job

Rigging up to deepen is General Petroleum's Llano Seco No. 1 in Sec. 33-20n-1w on the Llano Seco Rancho, Butte County. The hole presently is bottomed at 5456 ft.

Yolo County Try In View

In the Davis area of Yolo County, Standard of California has location staked for its Campbell Comm. No. 1 in Sec. 18-8n-2e. Shell Oil, meantime, is drilling Winters Comm. No. 4-1 in Sec. 19-8n-1e in the shallower formations.

Main Prairie Wildcat Flows

North of the Maine Prairie area, Amerada Petroleum's Wineman Comm. No. 1 in Sec. 22-6n-2e has been finished at 4815 ft. and is flowing to sump. The well, however, looks wet. Shell Oil's Wagenet No. 2 in Sec. 19-4n-1e in the Kirby Hills area is making hole ahead below 5500 ft.

Olivos Test Rigging Up

Near Zaca Creek in the Olivos area of Santa Barbara County, Tide Water Associated is rigging derrick to start the drill in its Quati No. 75 in Sec. 34-8n-31w.

Montalvo Test Outfitted Anew

Following gas blowout and fire, which destroyed surface equipment, Standard of California's McGrath No. 2 test in the Montalvo area has built new derrick and is about ready to resume operations. Original depth is 11,505 ft., with plug at 8660 ft. Casing is set on plug.

West Mountain Job Sets Pipe

Los Nietos Co. and Lucy Smith Battson, C. H. No. 3 in Sec. 23-3n-21w in the West Mountain area is standing with 7-in. casing set on plug at 5181 ft. Original bottom is 5181 ft.

In Sec. 22 Richfield Oil is prospecting ahead at 2750 ft. with Saticoy No. 1.

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McKittrick Area Active

E. A. Parkford's Parkford-McKittrick No. 1 wildcat test in Sec. 22-30s-22e in the McKittrick area is coring ahead in hard brown shale at 6076 ft. Victor Exploration has started work on its No. 1 in Sec. 32-29s-22e. Texas Co.'s Tulare No. 28-28 in Sec. 28-30s-22e is coring at 4780 ft. The company's Westpet Unit One No. 46 in Sec. 29-30s-22e is drilling at 3175 ft.

Jacalitos Try Stands Cemented

Bolsa Chica Oil's No. 36E-2 in Sec. 36-21s-15e on the southeast flank of the Jacalitos field is standing cemented at 4300 ft. Redrilled depth is 4678 ft., with top oil sand placed at 4652 ft. The 6⅝-in. casing was set at 4773 ft. and the 4¾-in. at 4678 ft.

Tulare County Wildcat Starts

Neely-Noonan Operations is preparing to launch an exploratory venture in the southwest quarter of Sec. 12-23s-26e in the Terra Bella area of Tulare County. Location falls about two miles northeast of Superior Oil's Day No. 24-22, which was abandoned some weeks ago, after testing showings found near bottom at 4175 ft.

Lanare Project Reaches 7330 Ft.

Bothered by circulation difficulties, Pacific Western Oil's Summit Lake No. 1 in Sec. 14-17s-18e in the Lanare area has reached 7330 ft. and is going ahead.

Cymric Area Active Center

Independent Exploration is drilling Roco No. 3 in Sec. 18-29s-21e in the Cymric area at 930 ft. Roco No. 4 is making progress in shale at 1950 ft. Texas Co.'s R. H. Anderson No. 63 in Sec. 20 is drilling at 2682 ft. R. H. Anderson Two No. 24 in the section is redrilled at 2145 ft.

Superior Oil is ready to pump its Carrec No. 86-22 in Sec. 22, after running tubing. Total depth is 6242 ft.

Coles Levee Test Drills

Seeking an easterly extension of Coles Levee production, Union Oil is drilling in sand and shale at 6590 ft. with Kernco No. 54-12 in Sec. 12-31s-25e, Kern County.

Lost Hills Well Drills

Richfield Oil's Frank Buck No. 1, a venture for oil not a great distance from the Lost Hills field in Sec. 6-27s-21e is drilling in sand and shale at 6513 ft.

Pleito Test Going Down

In the Pleito area near the Wheeler Ridge field, Independent Exploration is searching for new oil at a depth of 3650 ft. with KCL-A No. 11-10 in Sec. 10-10n-20w. Bandini Petroleum also holds an interest in the play.

Santiago Area Adds New Well

Richfield Oil has completed Leutholtz No. A-15 in Sec. 22-11n-23w in the Santiago area for 135 barrels of oil a day on the pump from 3573 ft. Interval open to production is between 3149 ft. and bottom. General Petroleum's Frankley No. 77-17 on Maricopa Flats in Sec. 17 is spot coring and drilling on down at 5030 ft.

Sand Hills Job Going

In the Sand Hills area of Kern County, Western Gulf is prospecting in sand and shale at 8250 ft. with S. P. No. 1 in Sec. 25-12n-20w. What may have been uncovered of interest to present depth is a company secret.

Tejon Field Extends North

C. C. M. O. Co. has completed No. 14-32 in Sec. 32-11n-19w as a successful north extension of the Tejon field, pumping 190 barrels of oil daily from 2611 ft. Richfield Oil's southeast outpost project, Tejon No. A-89-35, in Sec. 35-11n-19w is drilling and coring below 2000 ft.

Belridge Wells Making Hole Ahead

Richfield Oil's Berry No. 1 in Sec. 30-28s-21e in the South Belridge area is drilling in hard shale at 9353 ft. The Belridge No. B-2 in Sec. 21-27s-20e at North Belridge is making hole at 5920 ft.

Miramonte Test Drilling Out

East of the Lost Hills field and north of the Semitropic gas field, Pacific Western's National Royalties No. 1 in Sec. 5-26s-22e in the Miramonte area is drilling out cement. Effective depth is 12,300 ft.

Paloma Well Running Pipe

On the northeast edge of the Paloma field, General Petroleum is preparing to run a protective string in its Tupman No. 18-36 in Sec. 36-31s-26e. Bottomed at 11,921 ft. the hole may be carried deeper.

Trico Project Sets Surface Pipe

In Sec. 6-24s-23e in the Trico gas area of Tulare County, Pacific Western's Barry No. 1 is standing with surface pipe set at 455 ft. Shell Oil's Riverside-Bent-Mitchell No. 1 in Sec. 8 is down 3400 ft. and is engaged with cleanout operations.

Arvin Test Drills Ahead

Northeast of Arvin, Louis H. Didier is drilling below 900 ft. with No. 1 test in Sec. 10-31s-30e. Universal Consolidated is sidetracking at 5750 ft. with Universal-Derby No. 2 in Sec. 15, after going originally to 6119 ft.

Kern Front Job Planned

Elmer C. von Glahn, widely known member of the oil producing industry and prominent agriculturalist, has taken over the Watterson lease in the Kern Front field from Charles H. Kaar. Von Glahn plans another drilling job there in Sec. 26-28s-27e.

IF YOU WANT TO KEEP OUT OF *Scrapes*

...get a BAKER WALL SCRAPER on the job! It will enlarge the hole, or just scrape off the "cake" whichever you want. Blades open positively — do their stuff — and then close to come safely out of the hole. It's easy to run.

BAKER *Rotary* WALL SCRAPER

ASK THE *BAKER* MAN

Snowball Mountain Try Resumes Shortly

On Snowball Mountain not far from Carpinteria, Maurice T. Grubb is getting ready to resume operations in U. S. Snowball No. 1 in Sec. 19-4n-24w on Snowball Mountain, Ventura County. Total depth is 5290 ft.

Orcutt Well Drills Ahead

Southeast of the Orcutt field, Sunray Oil Corp. is drilling at 1625 ft. with Sunray Los Flores No. 1 in Sec. 4-8n-33w, Santa Barbara County.

Bardsdale Job Tests

Testing water shut off is the last word from W. H. (Bill) Geis, Geis-Robertson No. 1 in Sec. 12-3n-20w in the Bardsdale area, Ventura County. Hole is bottomed at 4950 ft., with casing cemented on bottom.

Ramona Well Starts Work

Texas Co. has spudded Kern No. 18 in Sec. 18-4n-17w in the Ramona area. Southern California Pet. Corp.'s Adams-Aguirre No. 104 in Sec. 13-4n-18w is making hole in sandy shale at 3600 ft.

Humboldt Co. Well Working

In the Mattole River Valley, Yatura Petroleum, Inc. is washing perforations in the 3-in. liner in the prospect job on Sec. 21-1s-2w, Humboldt County. Previously, gassy water was swabbed.

San Luis Obispo Wildcats Drilling

On the Bradley Anticline, E. B. Hall & Co. is drilling Mahoney No. 36-2 in Sec. 2-25s-12e, San Luis Obispo County, in hard brown shale and greenish gray silt below 2400 ft. Union Oil's Vernon Wineman No. 1 in Sec. 19-11n-33w adjacent to Nipomo is making the downward journey at 700 ft. The company's holdings in the area are extensive.

Hydesville Well Tests

Flow tests are being continued with Texas Co.'s Anderson No. 1 in Sec. 8-2n-1e in the Hydesville area of Humboldt County. Redrilled depth is 8769 ft., with casing set at 7870 ft. Original bottom was 9082 ft.

Cat Canyon Well Starts

General Petroleum has staked location for Dominion No. 41-14 north of Cat Canyon in Sec. 14-9n-33w, Santa Barbara County. Union Oil is starting five more wells on its Bell lease.

Elwood Adds New Producer

Signal Oil & Gas Co. has completed another well in the Elwood field. It is State No. 208-A in Sec. 8-4n-29w, which came in from 4705 ft. for 330 barrels of oil a day on the pump.

PENETRON SERVICE

Licensed under Texaco Development Company patents, now available in California, Penetron measures the thickness of plate, pipe wall, or wall of pressure vessels. Information so derived is of use in:

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Used by refineries, compressor plants, pressure processes and drilling companies.

Service on a daily basis with trained operator now available.

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Santa Barbara Projects Going

Near Coal Oil Point in Santa Barbara County, Honolulu Oil Corp. is drilling Honolulu - Signal - Goleta - Comm. No. 1 in Sec. 24-5n-29w below 5400 ft. Honolulu-Signal Macco-State No. 308-1 in the section is making fast time with the drill around 1700 ft.

Kings City Test Scene

In Thompson Gulch not many miles from King City, Shell Oil, Shell-Honolulu-Thorup-USL No. 1 in Sec. 4-20s-7e is still exploring ahead below 6200 ft.

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Two 125 h. p. 250# working pressure Broderick boilers Herley-Kelly, 3201 Pasadena Ave., Long Beach 7, Calif. Phone Long Beach 425-23. tf

THIS LAUGH

OFF!!

Asking a woman her age,
Is like buying a second-hand car;
The speedometer's been set back,
But you can't tell just how far.

Two cows were visiting after they both had been on vacation. Said the first cow, "Where I was there were beautiful green fields, and you should have seen the bulls that were frisking about!" Said the second cow, "Well, there were lots of green fields where I was, too, but the only companion I had was a steer, and all he could talk about was his operation."

Personnel man: "Do you go with girls?"

Applicant: "No, sir."

P.M.: "Do you mean to tell me you do not go with girls?"

A: "Yes, sir."

P.M.: "Why not?"

A: "My wife won't let me."

A visitor to an asylum asked an inmate his name.

"George Washington."

"But the last time I was here, you were Abraham Lincoln," the visitor said.

"That," said the man sadly, "was by my first wife."

Man: "When will your dad be fit for work again?"

Boy: "Can't say for certain, but it will be a long time."

Man: "What makes you think that?"

Boy: "Cause compensation's set in."

Little Willie, unafraid,
Monkeyed with a hand grenade;
Mother, at the morgue, complained:
"Willie sure is scatter-brained!"

Deb: "I'd like to buy a brassiere."

Clerk: "What bust?"

Deb: "Nothing bust. It just wore out."

"My son doesn't want to get married."

"Yeah? Just wait until the wrong girl comes along."

An insurance salesman tells about a valuable wardrobe which his firm insured for a client during a European trip. Upon reaching London, she wired: "Gown lifted in London."

After due deliberation he sent his reply: "What do you think our policy covers?"

"Those are my grandmother's ashes over there."

"Oh, so the poor soul has passed on?"

"No, she's too lazy to look for an ash tray."

Hubby returned home unexpectedly. A pair of shoes were on the floor. He went into a white fury. Picking them up, he looked at them, compared them with his own shoes, and then his anger subsided.

He put them down, great relief showing on his face. "For a minute I was ready to tear the house down," he explained. "I thought the maid had forgotten to put my shoes away, but I see these are not mine."

Two of the big white fathers in a nudist camp became involved in an argument. One lost his temper completely and began screaming at the top of his lungs. The other laid a restraining hand on his shoulder, and counseled. "Hector, Hector! Keep your shirt off!"

Last night I held a little hand.
So dainty and so sweet.
I thought my heart would surely break,
So wildly did it beat.
No other hand in all the world
Can greater solace bring,
Than the pretty hand I held last night—
Four aces and a king.

She: "No bachelor can understand women."

He: "Is that so? What else do you suppose makes a man a bachelor?"

JENSENS Fix TESPU (UPSET) Pumping Costs

Jensen Pumping Units have a knack of cutting pumping costs. This is no easy trick since it involves greater dependability, less maintenance, lower power costs, smaller initial investment, and others.

But for 27 years we have been working on just this — reducing pumping costs. Our customers tell us it has been time well spent.

A little time spent with your Jensen dealer will give you the benefit of a life's work. See him today.

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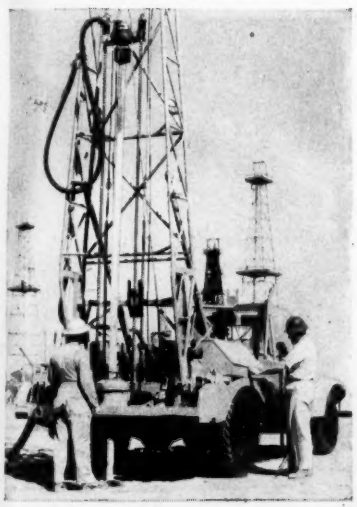
New York City

Western Geophysical Introduces New Drilling Unit

Western Geophysical Company of Los Angeles announces production of a self-lubricated, completely sealed portable drilling unit. Of particular interest is the fact that no lubrication is ever necessary on any functional part of the unit with the exception of one zerk on the pull down shaft and one zerk for swivel packing. Successfully developed for their own use in exploration work, the Model "1000" is now available for drilling shot holes, shallow oil and gas wells, water wells, disposal wells and other drilling operations.



The unit is mounted on a 1½ ton truck with a hydraulically raised 50,000 lb. capacity tubular steel mast. All power is from the truck engine to a power take-off and then transmitted through a central power unit to a 3-speed rotary table transmission, a double-drum winch and a 4½" x 6" Duplex pump and pull down unit. All parts are designed so that engine will stall before any part will break. Every functional part of the unit including swivel bearings feature dust-proof sealed oil bath lubrication and require no maintenance regardless of operating conditions. The rig is particularly recommended for hot, dusty corrosive areas where lubrication may present a problem.

The Model "1000" is rated at 1000′ with a 3" x 3" square kelly 14′ long, handling 2⅜" drill pipe and 6½" bit. Holes up to 1500′ have been drilled successfully with no strain on any part of the unit.

A brochure showing detailed information of the Model "1000" will be sent upon request.

Standard Using New Servicing Rig

Southern wells of The Standard Oil Company of California are being serviced these days by a portable well servicing rig embodying a number of new features, including the application of Hercules Diesel power.

The well servicing hoist, manufactured by Wagner-Morehouse Company of Los Angeles, is powered by a Hercules DRXC Power Unit that operates the double drum hoist mounted on a White truck in which a Hercules Model HXD gas engine is installed.

The machine's derrick is laid down over the unit for traveling and can be raised and telescoped upward into working position in about 10 minutes by the power unit.

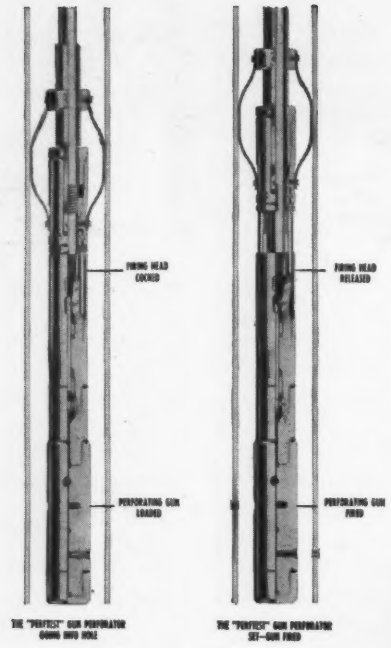
The manufacturer of the machine recommends it for use on wells up to 5500′ in 2½" tubing, but its capacity is known to extend up to 7700′ wells in 2½" wet tubing.

The mast is an Ideco product and is raised by the drilling line to a vertical position. When fully extended the mast is 62 ft. high in the clear and has a net hook capacity of 70,000 lbs. This mast does not require guys for production service.

The Johnson Perftest All Purpose Gun Perforator

The Johnston "PERFTEST" All Purpose Gun Perforator furnishes operators with a safe, mechanically-operated Gun Perforator which can be run in the well on tubing or drill string and can be used either for perforating alone, or, when attached

The new oil well servicing hoist of The Standard Oil Company of California.



to the Johnston Pressure Recorder and Formation Tester, as the perforating unit in **combined** perforation and formation testing operations.

For perforating casing the Johnston "PERFTEST" Gun Perforator is lowered to the zone selected for perforation on the bottom joint of tubing or drill string. It consists of a mechanical firing-head to which may be attached any number of perforating gun sections. Each section fires four or five bullets to form a pattern of perforations 90 degrees apart with a vertical measurement of 2½ inches from center to center. The number of perforating gun sections to be attached to the firing-head depends solely on the number of perforations desired and the extent of the zone to be pereforated.

The "PERFTEST" Gun Perforator is easily adapted to Johnston test equipment for combined Perforation and Test operations. By unitizing a Johnston "PERFTEST" Gun Perforator with a regular Johnston Formation Tester Assembly any designated formation can be both perforated **and** tested in one round trip of tubing or drill pipe.

Simple top-hole manipulation of the string by the driller fires the gun perforator to perforate casing and actuates the tester assembly to test formation immediately following perforation.

The manufacturer claims that besides its wide versatility of uses the 'PERFTEST" offers such advanced features as safer gun perforation operations—positive fire of all bullets—easier, faster gun perforator maintenance — exact positioning in test zone—no extra equipment needed. A new descriptive folder on the "PERFTEST" is available from M. O. Johnston Oil Field Service Company, 3117 San Fernando Road, Los Angeles, California.

Wire Rope Manufacturing & Equipment Company Opens New Los Angeles Office

Wire Rope Manufacturing & Equipment Company of Seattle has just moved into its new and enlarged location at 1855 Industrial Street, Los Angeles 21, Calif. Telephone: VAndike-2995.

Joseph A. Herron, special representative for the Company, has announced that his selling force will be augmented by the addition of a sales engineer to work with the industrial plants of this area.

Santa Fe Drilling Company at Brea is operating a new Ideco H-40-D air-controlled draw works powered by a General Motors twin Diesel engine, rated at 290 H.P. at 1800 r.p.m. with a Twin Disc torque converter. The mast is the new Ideco 96 ft. telescopic with 250,000 lb. net hook capacity.

The drilling unit, less rotary table substructure, is trailer mounted. The pump is a 7¾x14 Emsco powered by a single LeRoi 12 cyl. 350 H.P. engine and is also mounted on a trailer.

This rig and a twin operated by Apex Petroleum Corp. Ltd. represent ultra modern, extremely portable drilling equipment for depths from 6,000 to 7,000 feet.